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Fritz Winter
North America LP

Fritz Winter North America LP, 1 Fritz Winter Drive, Franklin, KY 42134

4/23/2021

Kentucky Division for Air Quality
Attn: Permit Support Section
300 Sower Boulevard
Frankfort, Kentucky 40601

RECEIVED
MAY 03 2021
Permit Review Branch
Division for Air Quality

Title V Operating Permit Renewal Application
Fritz Winter North America, LP – Franklin, Kentucky
Permit: V-16-022 R1
Agency Interest: 129745

Dear Sir or Madam:

Please find the attached forms for renewal of the above referenced Title V Operating Permit.

As required per 401 KAR 52:020 Section 4(2)(c), renewals are to provide only the information that is new or different from the most recent source-wide permit application and a 401 KAR 52:020 Section 23 certification by the responsible official.

Fritz Winter North America, LP (FWNA) is continuing to work towards execution of an Agreed Order with Kentucky Department for Environmental Protection and the Division for Air Quality to address several of the terms and conditions in the existing Air Quality Permit referenced above. Out of that effort we expect a number of changes to the existing Air Permit that will be reflected in a new construction permit application that will be submitted to your office within the coming months.

In addition to the Administration Information form (Form DEP7007AI), we are providing requested changes and clarifications to the most recent source-wide permit application using both the Manufacturing Form (Form DEP7007B) and the Source Emissions Profile Form (DEP7007N).

Please contact Eddie Butler at eddie.butler@fritzwinter.us should you have any questions regarding this application.

Based on information and belief formed after reasonable inquiry, the statements and information contained in the permit renewal document(s) are true, accurate and complete.

Respectfully submitted,

Darryl Konsler
CEO

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information

___ Section AI.2: Applicant Information

___ Section AI.3: Owner Information

___ Section AI.4: Type of Application

___ Section AI.5: Other Required Information

___ Section AI.6: Signature Block

___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

___ Additional Documentation attached

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 3/29/2021

Section AI.1: Source Information

Physical Location Address:	**Street:**	1 Fritz Winter Drive				
	City:	Franklin	**County:**	Simpson	**Zip Code:**	42134
Mailing Address:	**Street or P.O. Box:**	1 Fritz Winter Drive				
	City:	Franklin	**State:**	KY	**Zip Code:**	42134

Standard Coordinates for Source Physical Location

Longitude: 36.79583 (decimal degrees) **Latitude:** -86.553611 (decimal degrees)

Primary (NAICS) Category: Motor Vehicle Brake System Mfg. **Primary NAICS #:** 336340

Classification (SIC) Category: Motor Vehicle Parts and Accessories **Primary SIC #:** 3714

Briefly discuss the type of business conducted at this site: The casting and machining of iron parts for the automotive industry.

Description of Area Surrounding Source: ☐ Rural Area ☑ Industrial Park ☐ Residential Area ☐ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employees: 300

Approximate distance to nearest residence or commercial property: *0.4 miles*

Property Area:

Is this source portable? ☐ Yes ☑ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☑ Currently Hold	☐ Need	☐ N/A
RCRA:	☑ Currently Hold	☐ Need	☐ N/A
UST:	☐ Currently Hold	☐ Need	☑ N/A

Type of Regulated Waste Activity: ☐ Mixed Waste Generator ☑ Generator ☐ Recycler ☐ Other: ☐ U.S. Importer of Hazardous Waste ☐ Transporter ☐ Treatment/Storage/Disposal Facility ☐ N/A

Section AI.2: Applicant Information

Applicant Name: Fritz Winter North America, LP

Title: (if individual)

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** KY **Zip Code:** 42134

Email: (if individual)

Phone: (270) 813-4000

Technical Contact

Name: Hauke May

Title: Project Manager

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** Kentucky **Zip Code:** 42134

Email: hauke.may@fritzwinter.us

Phone: (270) 813-4000

Air Permit Contact for Source

Name: Eddie Butler

Title: EHS Manager

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** Kentucky **Zip Code:** 42134

Email: eddie.butler@fritzwinter.us

Phone: (270) 813-4000

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name:

Title:

Mailing Address: **Street or P.O. Box:**
City: **State:** **Zip Code:**

Email:

Phone:

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☐ Significant Revision	☐ Administrative Permit Amendment
☑ Renewal Permit	☐ Revised Registration	☐ Minor Revision	☐ Initial Source-wide OperatingPermit
☐ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☐ Revision	☐ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☑ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☑ Yes ☐ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☑ Particulate Matter	See Air Quality Permit	☑ Single HAP	
☑ Volatile Organic Compounds (VOC)	V-16-022 R1	☑ Combined HAPs	
☑ Carbon Monoxide		☐ Air Toxics (40 CFR 68, Subpart F)	
☑ Nitrogen Oxides		☐ Carbon Dioxide	
☑ Sulfur Dioxide		☐ Greenhouse Gases (GHG)	
☑ Lead		☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* _____ **Proposed Operation Start-Up Date:** *(MM/YYYY)* _____

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)* _____ **Proposed Operation Start-Up Date:** *(MM/YYYY)* _____

Applicant is seeking coverage under a permit shield. ☐ **Yes** ☑ **No** **Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.**

Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

☐ DEP7007A Indirect Heat Exchangers and Turbines	☐ DEP7007CC Compliance Certification
☑ DEP7007B Manufacturing or Processing Operations	☐ DEP7007DD Insignificant Activities
☐ DEP7007C Incinerators and Waste Burners	☐ DEP7007EE Internal Combustion Engines
☐ DEP7007F Episode Standby Plan	☐ DEP7007FF Secondary Aluminum Processing
☐ DEP7007J Volatile Liquid Storage	☐ DEP7007GG Control Equipment
☐ DEP7007K Surface Coating or Printing Operations	☐ DEP7007HH Haul Roads
☐ DEP7007L Mineral Processes	☐ Confidentiality Claim
☐ DEP7007M Metal Cleaning Degreasers	☐ Ownership Change Form
☑ DEP7007N Source Emissions Profile	☐ Secretary of State Certificate
☐ DEP7007P Perchloroethylene Dry Cleaning Systems	☐ Flowcharts or diagrams depicting process
☐ DEP7007R Emission Offset Credit	☐ Digital Line Graphs (DLG) files of buldings, roads, etc.
☐ DEP7007S Service Stations	☐ Site Map
☐ DEP7007T Metal Plating and Surface Treatment Operations	☐ Map or drawing depicting location of facility
☐ DEP7007V Applicable Requirements and Compliance Activities	☐ Safety Data Sheet (SDS)
☐ DEP7007Y Good Engineering Practice and Stack Height Determination	☐ Emergency Response Plan
☐ DEP7007AA Compliance Schedule for Non-complying Emission Units	☐ Other: _____
☐ DEP7007BB Certified Progress Report	

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.

Authorized Signature	4/23/2021 **Date**
Darryl Konsler **Type or Printed Name of Signatory**	CEO **Title of Signatory**

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations
Form identifies revised technical and environmental contact.

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007B

Manufacturing or Processing Operations

___ Section B.1: Process Information
___ Section B.2: Materials and Fuel Information
___ Section B.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.
___ Attach a flow diagram
___ Attach SDS

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 3/30/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU01	Scrap Steel Storage	Storage area for scrap steel for processing	EU01	Scrap Steel Storage	N/A	N/A	09/2016	Continuous	N/A	N/A
EU02	Alloy Storage	Segregated bins for alloy mixing and deployment	EU02	Alloy Storage	N/A	Custom fabricated	03/2017	Continuous	N/A	N/A
EU03	Scrap Drying	Drying Scrap prior to Melt	EU03	Scrap Drying	--	--	--	--	--	--
EU04	Scrap Cleaning	Cleaning Scrap prior to Melt	EU04	Scrap Cleaning	--	--	--	--	--	--
EU05	Refractory Burner #1	Portable gas ladle drying unit	EU05	Refractory Burner #1	Gaylord	1.3MM-FDS-63	06/2017	Batch	Varies	Varies
EU06	Refractory Burner #2	Portable gas ladle drying unit	EU06	Refractory Burner #2	Gaylord	1.3MM-FDS-63	12/2020	Batch	Varies	Varies
EU07	Induction Furnace #1	Induction powered melt furnace	EU07	Induction Furnace #1	Junker	MFTGe Duomelt	03/2017	Batch	Varies	Varies
EU08	Induction Furnace #2	Induction powered melt furnace	EU08	Induction Furnace #2	Junker	MFTGe Duomelt	03/2017	Batch	Varies	Varies
EU09	Induction Furnace #3	Induction powered melt furnace	EU09	Induction Furnace #3	Junker	MFTGe Duomelt	07/2019	Batch	Varies	Varies
EU10	Induction Furnace #4	Induction powered melt furnace	EU10	Induction Furnace #4	Junker	MFTGe Duomelt	07/2019	Batch	Varies	Varies

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EU11	Holding Furnace #1	Storage vessel for molten iron	EU11	Holding Furnace #1	--	--	--	--	--	--
EU12	Holding Furnace #2	Storage vessel for molten iron	EU12	Holding Furnace #2	--	--	--	--	--	--
EU13	Transport Ladle #1	Transfer vessel between Melt and Pour	EU13	Transport Ladle #1	N/A	Custom fabricated	03/2017	Continuous	N/A	N/A
EU14	Transport Ladle #2	Transfer vessel between Melt and Pour	EU14	Transport Ladle #2	N/A	Custom fabricated	03/2017	Continuous	N/A	N/A
EU15	Pouring Furnace #1	Pressurized Holding Vessel for Pouring #1	EU15	Pouring Furnace #1	Junker	RGDGe	Purchased but not installed	--	--	--
EU16	Pouring Furnace #2	Pressurized Holding Vessel for Pouring #2	EU16	Pouring Furnace #2	Junker	RGDGe	03/2017	Continuous	N/A	N/A
EU17	Melt and Core/Mold Shop Baghouse Waste Dust Silo	Melt/Mold Baghouse Waste Dust Silo	EU17	Melt and Core/Mold Shop Baghouse Waste Dust Silo	Luhr	Custom Fabrication	09/2016	Batch	Varies	Varies
EU18	Refractory Curing Mobile Burner	Mobile Curing Burner	EU18	Refractory Curing Mobile Burner	N/K	N/K	05/2017	Batch	Varies	Varies
EU19	Mold Silica Sand Silo	Outside Silica Sand Silo	EU19	Mold Silica Sand Silo	Sand Mold Systems	Custom Fabrication	03/2017	Batch	Varies	Varies
EU20	Blend Silo	Outside Blend/Premix Silo	EU20	Blend Silo	Sand Mold Systems	Custom Fabrication	03/2017	Batch	Varies	Varies

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Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU21	Bentonite Silo	Outside Bentonite Silo	EU21	Bentonite Silo	Sand Mold Systems	Custom Fabrication	03/2017	Batch	Varies	Varies
EU22	Mold Silica Sand Bin	Inside Mold Sand Bin prior to Mixers	EU22	Mold Silica Sand Bin	Sand Mold Systems	Custom Fabrication	03/2017	Batch	Varies	Varies
EU23	Blend Bin	Inside Mold Sand Bin prior to Mixers	EU23	Blend Bin	Sand Mold Systems	Custom Fabrication	03/2017	Batch	Varies	Varies
EU24	Bentonite Bin	Inside Mold Sand Bin prior to Mixers	EU24	Bentonite Bin	Sand Mold Systems	Custom Fabrication	03/2017	Batch	Varies	Varies
EU26	Mold Silica Sand Weigh Hopper	Mold Sand Weigh Hopper prior to Mixers	EU26	Mold Silica Sand Weigh Hopper	Sand Mold Systems	90 mk2	03/2017	Batch	Varies	Varies
EU27	Blend Weigh Hopper	Blend Weigh Hopper Prior to Mixers	EU27	Blend Weigh Hopper	Sand Mold Systems	90 mk2	03/2017	Batch	Varies	Varies
EU28	Bentonite Weigh Hopper	Bentonite Weigh Hopper prior to Mixers	EU28	Bentonite Weigh Hopper	Sand Mold Systems	90 mk2	03/2017	Batch	Varies	Varies
EU29	Dust Weigh Hopper	Dust Weigh Hopper	EU29	Dust Weigh Hopper	Sand Mold Systems	90 mk2	03/2017	Batch	Varies	Varies
EU30	Green Sand Mixer #1	Mixes, sand, bentonite, blend/premix, and water to prepare mold sand	EU30	Green Sand Mixer #1	Sand Mold Systems	B&P 100 B	03/2017	Batch	Varies	Varies

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EU31	Green Sand Mixer #2	Mixes, sand, bentonite, blend/premix, and water to prepare mold sand	EU31	Green Sand Mixer #2	Sand Mold Systems	B&P 100 B	03/2017	Batch	Varies	Varies
EU32	Green Sand Mixer #3	Mixes, sand, bentonite, blend/premix, and water to prepare mold sand	EU32	Green Sand Mixer #3	Sand Mold Systems	B&P 100 B	03/2017	Batch	Varies	Varies
EU33	Mold Stamping #1	Mold Making	EU33	Mold Stamping #1	Heinrich Wagner Sinto	ZFS-SD	01/2017	Batch	Varies	Varies
EU34	Mold Stamping #2	Mold Making	EU34	Mold Stamping #2	--	--	--	--	--	--
EU35A	Core Silica Sand Silo A	Core Sand Silo	EU35A	Core Silica Sand Silo A	Laempe	Custom Fabricated	02/2017	Batch	Varies	Varies
EU35B	Core Silica Sand Silo B	Core Sand Silo	EU35B	Core Silica Sand Silo B	Laempe	Custom Fabricated	02/2017	Batch	Varies	Varies
EU36	Sand Classifier	Sand Classifier	EU36	Sand Classifier	Laempe	Custom Fabricated	02/2017	Continuous	N/A	N/A
EU37	Core Silica Sand Bin	Core Sand Bin	EU37	Core Silica Sand Bin	Laempe	Custom Fabrication	03/2017	Batch	Varies	Varies
EU38	Core Silica Sand Weigh Hopper	Core Sand Weigh Hopper	EU38	Core Silica Sand Weigh Hopper	Laempe	Custom Fabrication	03/2017	Batch	Varies	Varies
EU39	Core Machine #1	Core Making Machine	EU39	Core Machine #1	Laempe	LHL50	03/2017	Batch	Varies	Varies

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Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU40	Core Machine #2	Core Making Machine	EU40	Core Machine #2	Leampe	LHL50	03/2019	Batch	Varies	Varies
EU41	Core Machine #3	Core Making Machine	EU41	Core Machine #3	--	--	--	--	--	--
EU42	Core Machine #4	Core Making Machine	EU42	Core Machine #4	--	--	--	--	--	--
EU43	Core Removal	Removing Core from Core Machine	EU43	Core Removal	N/A	N/A	03/2017	Continuous	N/A	N/A
EU44	Dryer #1	Core Drying Machine	EU44	Dryer #1	ELPO	Custom Fabrication	04/2017	Continuous	N/A	N/A
EU45	Dryer #2	Core Drying Machine	EU45	Dryer #2	ELPO	Custom Fabrication	03/2019	Continuous	N/A	N/A
EU46	Dryer #3	Core Drying Machine	EU46	Dryer #3	--	--	--	--	--	--
EU47	Dryer #4	Core Drying Machine	EU47	Dryer #4	--	--	--	--	--	--
EU48	Mold Assembly #1	Mold Making Machine	EU48	Mold Assembly #1	Heinrich Wagner Sinto	ZFS-SD	01/2017	Batch	Varies	Varies
EU49	Mold Assembly #2	Mold Making Machine	EU49	Mold Assembly #2	--	--	--	--	--	--

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EU50	Pouring #1	Pouring of molten metal into sand molds	EU50	Pouring #1	Junker	RGDGe	03/2017	Continuous	N/A	N/A
EU51	Pouring #2	Pouring of molten metal into sand molds	EU51	Pouring #2	--	--	--	--	--	--
EU52	Cooling Tunnel	Cooling of casting with sand mold.	EU52	Cooling Tunnel	Heinrich Wagner Sinto	ZFS-SD	01/2017	Continuous	N/A	N/A
EU53	Shakeout Conveyor	Separation of solidified casting and sand mold/core	EU53	Shakeout Conveyor	General Kinematics	Custom Fabrication	01/2017	Continuous	N/A	N/A
EU54	Sand Cooler	Cooler to reduce the return sand temperature	EU54	Sand Cooler	Luhr	Custom Fabrication	03/2017	Continuous	Varies	Varies
EU55	Used Mold and Core Sand Storage	Storage of return sand	EU55	Used Mold and Core Sand Storage	General Kinematics	Custom Fabrication	05/2017	Batch	N/A	N/A
EU56	Sand Screening	Sizing of return sand	EU56	Sand Screening	General Kinematics	Custom Fabrication	03/2017	Continuous	N/A	N/A
EU57	Sand Plant Waste Sand Silo	Silo for Waste Sand	EU57	Sand Plant Waste Sand Silo	Vogel & Schemmann	CBC-9/30	03/2017	Batch	Varies	Varies
EU58	Mold Shop Baghouse Waste Dust Silo	Mold Shop Baghouse Waste Dust Silo	EU58	Mold Shop Baghouse Waste Dust Silo	--	--	--	--	--	--
EU59	Forced Air Cooler	Vibratory Casting Cooling Conveyor	EU59	Forced Air Cooler	General Kinematics	Custom Fabrication	01/2017	Continuous	N/A	N/A

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EU60	Sorting	Finished Product /Casting Scrap separation	EU60	Sorting	General Kinematics	Custom Fabrication	12/2016	Continuous	N/A	N/A
EU61	Steel Shot Blasting #1	Finished Product Blast Cleaning	EU61	Steel Shot Blasting #1	Vogel & Schemmann	CBC-9/30	04/2017	Continuous	N/A	N/A
EU62	Steel Shot Blasting #2	Finished Product Blast Cleaning	EU62	Steel Shot Blasting #2	--	--	--	--	--	--
EU63	Fettling Baghouse Waste Dust Silo	Outside Fettling Baghouse Waste Dust Silo	EU63	Fettling Baghouse Waste Dust Silo	Luhr	Custom Fabrication	11/2016	Batch	Varies	Varies
EU64	Grinding #1	Grinder for flash removal	EU64	Grinding #1	Reichmann	S1C	02/2019	Continuous	N/A	N/A
EU65	Grinding #2	Grinder for flash removal	EU65	Grinding #2	--	--	--	--	--	--
EU66	Turning Lathes (8)	Turn and balance to final product specifications	EU66	Turning Lathes (8)	EMAG	VL8	04/2017	Continuous	N/A	N/A
EU67	Drilling & Milling (2)	Turn, balance & drill to final product specifications	EU67	Drilling & Milling (2)	EMAG	VL8	04/2017	Continuous	N/A	N/A
EU68	Paint Booth #1	Post-induction coating machine	EU68	Paint Line #3	Sturm	ZS16	09/2018	Continuous	N/A	N/A
EU69	Paint Booth #2	Post-induction coating machine	EU69	Paint Booth #2	Sturm	ZS16	11/2017	Continuous	N/A	N/A

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Date: 4/1/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU70	Paint Booth #3	Post-induction coating machine	EU70	Paint Line #2	--	--	--	--	--	--
EU71	Paint Booth #4	Pre-induction coating machine	EU71	Paint Line #1	Sturm	ZS16	03/2017	Continuous	N/A	N/A
EU72	Emergency Generator #1	Generators for Emergency Power 1050 HP	EU72	Emergency Generator #1	Caterpillar	C27	09/2016	--	--	--
EU73	Emergency Generator #2	Generators for Emergency Power 1050 HP	EU73	Emergency Generator #2	Caterpillar	C27	09/2016	--	--	--
EU74	Emergency Generator #3	Generators for Emergency Power 57 HP	EU74	Emergency Generator #3	Caterpillar	C4.4	09/2016	--	--	--
EU75	Gasoline Storage Tank	2,000 gal gasoline storage tank	EU75	Gasoline Storage Tank	--	--	--	--	--	--
EU76	Diesel Storage Tank	2,000 gal diesel storage tank	EU76	Diesel Storage Tank	N/A	N/A	07/2019	--	--	--
EU77	Paved Roadways	Paved Roadways and Parking Areas	EU77	Paved Roadways	N/A	N/A	09/2016	--	--	--
EU78	Snag Grinder #1	Grinder for flash removal	EU78	Snag Grinder #1	N/K	N/K	04/2017	Continuous	N/A	N/A
EU79	Snag Grinder #2	Grinder for flash removal	EU79	Snag Grinder #2	N/K	N/K	04/2017	Continuous	N/A	N/A

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU01	Scrap Steel Storage	Scrap Steel	25.3	tons/hr	25.3 tons/hr	Steel Scrap	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU02	Alloy Storage	Copper, Manganese, Flux	0.56	tons/hr	0.56 tons/hr	Alloy Charge	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU03	Scrap Drying	Scrap Steel	-	-	-	-	-	-	-	-	-	-	-	-	-
EU04	Scrap Cleaning	Scrap Steel	-	-	-	-	-	-	-	-	-	-	-	-	-
EU05	Refractory Burner #1	NA	--	--	--	NA	--	--	Natural Gas	8.5	MMbtu/ Hr	73	MMscf/ Yr	0%	0%
EU06	Refractory Burner #2	NA	--	--	--	NA	--	--	Natural Gas	8.5	MMbtu/ Hr	73	MMscf/ Yr	0%	0%
EU07	Induction Furnace #1	Scrap Steel, Alloys	10	tons/hr	10 tons/hr	Molten Grey Iron	10	tons/hr	Electric Induction	N/A	--	N/A	--	0%	0%
EU08	Induction Furnace #2	Scrap Steel, Alloys	10	tons/hr	10 tons/hr	Molten Grey Iron	10	tons/hr	Electric Induction	N/A	--	N/A	--	0%	0%
EU09	Induction Furnace #3	Scrap Steel, Alloys	10	tons/hr	10 tons/hr	Molten Grey Iron	10	tons/hr	Electric Induction	N/A	--	N/A	--	0%	0%
EU10	Induction Furnace #4	Scrap Steel, Alloys	10	tons/hr	10 tons/hr	Molten Grey Iron	10	tons/hr	Electric Induction	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

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Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input		Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output		Fuel Type	Maximum Hourly Fuel Usage Rate		Maximum Yearly Fuel Usage Rate		Sulfur Content (%)	Ash Content (%)
				(Specify Units/hr)				(Specify Units/hr)			(Specify Units)		(Specify Units)		
EU11	Holding Furnace #1	Molten Grey Iron	25.3	tons/hr	25.3 tons/hr	Molten Grey Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU12	Holding Furnace #2	Molten Grey Iron	25.3	tons/hr	25.3 tons/hr	Molten Grey Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU13	Transport Ladle #1	Molten Grey Iron	25.3	tons/hr	25.3 tons/hr	Molten Grey Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU14	Transport Ladle #2	Molten Grey Iron	25.3	tons/hr	25.3 tons/hr	Molten Grey Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU15	Pouring Furnace #1	Molten Grey Iron	25.3	tons/hr	25.3 tons/hr	Molten Grey Iron	25.3	tons/hr	Electric Induction	2.91	MMbtu/ Hr	24.99	MMscf/ Yr	0%	0%
EU16	Pouring Furnace #2	Molten Grey Iron	25.3	tons/hr	25.3 tons/hr	Molten Grey Iron	25.3	tons/hr	Electric Induction	2.91	MMbtu/ Hr	24.99	MMscf/ Yr	0%	0%
EU17	Melt and Core/Mold Shop Baghouse Waste Dust Silo	Molten Grey Iron	25.3	tons/hr	25.3 tons/hr	Molten Grey Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU18	Refractory Curing Mobile Burner	NA	--	--	--	NA	--	--	Natural Gas	2	MMbtu/ Hr	17.18	MMscf/ Yr	0%	0%
EU19	Mold Silica Sand Silo	Sand	25	tons/hr	25 tons/hr	Sand	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU20	Blend Silo	Blend	25	tons/hr	25 tons/hr	Blend	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU21	Bentonite Silo	Bentonite	25	tons/hr	25 tons/hr	Bentonite	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU22	Mold Silica Sand Bin	Sand	197	tons/hr	197 tons/hr	Sand	197	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU23	Blend Bin	Blend	1.15	tons/hr	1.15 tons/hr	Blend	1.15	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU24	Bentonite Bin	Bentonite	0.16	tons/hr	0.16 tons/hr	Bentonite	0.16	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU26	Mold Silica Sand Weigh Hopper	Sand	197	tons/hr	197 tons/hr	Sand	197	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU27	Blend Weigh Hopper	Blend	1.15	tons/hr	1.15 tons/hr	Blend	1.15	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU28	Bentonite Weigh Hopper	Bentonite	0.16	tons/hr	0.16 tons/hr	Bentonite	0.16	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU29	Dust Weigh Hopper	Waste Sand	2.8	tons/hr	2.8 tons/hr	Waste Sand	2.8	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU30	Green Sand Mixer #1	Sand, blend, bentonite, water	66	tons/hr	66	Green Sand	66	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input		Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output		Fuel Type	Maximum Hourly Fuel Usage Rate		Maximum Yearly Fuel Usage Rate		Sulfur Content (%)	Ash Content (%)
				(Specify Units/hr)				(Specify Units/hr)			(Specify Units)		(Specify Units)		
EU31	Green Sand Mixer #2	Sand, blend, bentonite, water	66	tons/hr	66 tons/hr	Green Sand	66	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU32	Green Sand Mixer #3	Sand, blend, bentonite, water	66	tons/hr	66 tons/hr	Green Sand	66	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU33	Mold Stamping #1	Prepared Mold Sand	99	tons/hr	99 tons/hr	Green Sand	99	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU34	Mold Stamping #2	Prepared Mold Sand	99	tons/hr	99 tons/hr	Green Sand	99	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU35A	Core Silica Sand Silo A	Core Sand	25	tons/hr	25 tons/hr	Core Sand	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU35B	Core Silica Sand Silo B	Core Sand	25	tons/hr	25 tons/hr	Core Sand	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU36	Sand Classifier	Core Sand	3.7	tons/hr	3.7 tons/hr	Core Sand	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU37	Core Silica Sand Bin	Core Sand	3.7	tons/hr	3.7 tons/hr	Core Sand	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU38	Core Silica Sand Weigh Hopper	Core Sand	3.7	tons/hr	3.7 tons/hr	Core Sand	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU39	Core Machine #1	Core Sand Resin Catalyst Release Agent	3.7 34 1.98 4.2	tons/hr lbs/hr lbs/hr lbs/hr	3.7	Uncoated Cores	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU40	Core Machine #2	Core Sand Resin Catalyst Release Agent	3.7 34 1.98 4.2	tons/hr lbs/hr lbs/hr lbs/hr	3.7 tons/hr	Uncoated Cores	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU41	Core Machine #3	Core Sand Resin Catalyst Release Agent	3.7 34 1.98 4.2	tons/hr lbs/hr lbs/hr lbs/hr	3.7 tons/hr	Uncoated Cores	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU42	Core Machine #4	Core Sand Resin Catalyst Release Agent	3.7 34 1.98 4.2	tons/hr lbs/hr lbs/hr lbs/hr	3.7 tons/hr	Uncoated Cores	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU43	Core Removal	Uncoated Cores	3.7	tons/hr	3.7 tons/hr	Uncoated Cores	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU44	Dryer #1	Uncoated Cores Wash	3.7 34	tons/hr lbs/hr	3.7 tons/hr	Dry Coated Cores	3.7	tons/hr	Natural Gas	4.0	MMbtu/ Hr	34.35	MMscf/yr	0%	0%
EU45	Dryer #2	Uncoated Cores Wash	3.7 34	tons/hr lbs/hr	3.7 tons/hr	Dry Coated Cores	3.7	tons/hr	Natural Gas	4.0	MMbtu/ Hr	34.35	MMscf/yr	0%	0%
EU46	Dryer #3	Uncoated Cores Wash	3.7 34	tons/hr lbs/hr	3.7 tons/hr	Dry Coated Cores	3.7	tons/hr	Natural Gas	4.0	MMbtu/ Hr	34.35	MMscf/yr	0%	0%
EU47	Dryer #4	Uncoated Cores Wash	3.7 34	tons/hr lbs/hr	3.7 tons/hr	Dry Coated Cores	3.7	tons/hr	Natural Gas	4.0	MMbtu/ Hr	34.35	MMscf/yr	0%	0%
EU48	Mold Assembly #1	Molds Cores	99.15 1.8	tons/hr tons/hr	100.9 tons/hr	Mold Assembles	100.9 tons/hr	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU49	Mold Assembly #2	Molds Cores	99.15 1.8	tons/hr tons/hr	100.9 tons/hr	Mold Assembles	100.9 tons/hr	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

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Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU50	Pouring #1	Assembled Molds Gray Iron	100.9 25.3	tons/hr tons/hr	126.2 tons/hr	Poured mold	126.2	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU51	Pouring #2	Assembled Molds Gray Iron	100.9 25.3	tons/hr tons/hr	126.2 tons/hr	Poured mold	126.2	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU52	Cooling Tunnel	Poured Mold	126.2	tons/hr	126.2 tons/hr	Poured mold	126.2	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU53	Shakeout Conveyor	Poured Mold	126.2	tons/hr	126.2 tons/hr	Rough Casting	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU54	Sand Cooler	Recycled Sand	194	tons/hr	194 tons/hr	Recycled Sand	194	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU55	Used Mold and Core Sand Storage	Recycled Sand	194	tons/hr	194 tons/hr	Recycled Sand	194	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU56	Sand Screening	Recycled Sand	202	tons/hr	202 tons/hr	Recycled Sand	202	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU57	Sand Plant Waste Sand Silo	Recycled Sand	202	tons/hr	202 tons/hr	Recycled Sand	202	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU58	Mold Shop Baghouse Waste Dust Silo	Gray Iron	25.3	tons/hr	25.3 tons/hr	Gray Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU59	Forced Air Cooler	Rough Casting	25.3	tons/hr	25.3 tons/hr	Rough Casting	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU60	Sorting	Rough Casting	25.3	tons/hr	25.3 tons/hr	Rough Casting	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU61	Steel Shot Blasting #1	Rough Casting	25.3	tons/hr	25.3 tons/hr	Cleaned Casting	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU62	Steel Shot Blasting #2	Rough Casting	25.3	tons/hr	25.3 tons/hr	Cleaned Casting	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU63	Fettling Baghouse Waste Dust Silo	Gray Iron	25.3	tons/hr	25.3 tons/hr	Gray Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU64	Grinding #1	Cleaned Casting	25.3	tons/hr	25.3 tons/hr	Ground Cleaned Casting	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU65	Grinding #2	Cleaned Casting	25.3	tons/hr	25.3 tons/hr	Ground Cleaned Casting	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU66	Turning Lathes (8)	Gray Iron	25.3	tons/hr	25.3 tons/hr	Gray Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU67	Drilling & Milling (2)	Gray Iron	25.3	tons/hr	25.3 tons/hr	Gray Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU68	Paint Booth #1	Machined Castings Post-Induction Coating	28.9	lb/hr	N/K	Coated Finished Casting	N/K	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU69	Paint Booth #2	Machined Castings Post-Induction Coating	28.9	lb/hr	N/K	Coated Finished Casting	N/K	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU70	Paint Booth #3	Machined Castings Post-Induction Coating	28.9	lb/hr	N/K	Coated Finished Casting	N/K	tons/hr	N/A	N/A	--	NA	--	0%	0%
EU71	Paint Booth #4	Machined Castings Pre-Induction Coating	2.38	lb/hr	N/K	Coated Finished Casting	N/K	tons/hr	N/A	N/A	--	NA	--	0%	0%
EU72	Emergency Generator #1	--	--	--	N/A	--	--	--	Diesel	N/K	Gallons	N/K	Gallons	0%	0%
EU73	Emergency Generator #2	--	--	--	N/A	--	--	--	Diesel	N/K	Gallons	N/K	Gallons	0%	0%
EU74	Emergency Generator #3	--	--	--	N/A	--	--	--	Diesel	N/K	Gallons	N/K	Gallons	0%	0%
EU75	Gasoline Storage Tank	Gasoline	NK	gal/hr	N/A	--	--	Gallons	N/A	N/A	--	N/A	--	0%	0%
EU76	Diesel Storage Tank	Diesel	NK	gal/hr	N/A	--	--	Diesel	N/A	N/A	--	N/A	--	0%	0%
EU77	Paved Roadways	Vehicle Mile Traveled	NA	NA	N/A	--	--	VMT	N/A	N/A	--	N/A	--	0%	0%
EU78	Snag Grinder #1	Cleaned Casting	NK	tons/hr	N/K	Ground Cleaned Casting	N/K	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU79	Snag Grinder #2	Cleaned Casting	NK	tons/hr	N/K	Ground Cleaned Casting	N/K	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.3: Notes, Comments, and Explanations

The following Emission Units have yet to be installed: EU03, EU04, EU11, EU12, EU15, EU34, EU41, EU42, EU46, EU47, EU49, EU51, EU58, EU62, EU65 (on order/not installed), EU70, EU75
EU77 : Change Paved Roadways from EU76 to EU77 as EU76 is already identified as the ID for the diesel storage tank.
EU11-EU16: Change operating limit to 91,586 tpy; incorrect assumption to split 50:50
EU17: Change description from "Melt Shop Baghouse Waste Dust Silo" to "Core/Mold Baghouse Waste Dust Silo"
EU19-EU21, EU35A-EU35B: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU21-EU34,EU48,EU49: Combine into a single emission unit described as "Moldmaking and Sand Handling" with Emission Unit ID EU21 to match SCC description
EU33-EU34: Change maximum hourly capacity as 1975 tph for the group; incorrect assumption to split 50:50
EU50-EU51: Change maximum hourly capacity to 25.3 tph for group; incorrect assumption to split 50:50
EU68, EU69 and EU71: Change emission unit name to Paint Line #3, Paint Line #2 and Paint Line #1, respectively

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
EU01	Scrap Steel Storage	EU01	Scrap Steel Storage	Melt Baghouse	CU01	ST02	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU02	Alloy Storage	EU02	Alloy Storage	Melt Baghouse	CU01	ST02	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU03	Scrap Drying	EU03	Scrap Drying	N/A	N/A	N/A	7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU04	Scrap Cleaning	EU04	Scrap Cleaning	Melt Baghouse	CU01	ST02	14	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU05	Refractory Burner #1	EU05	Refractory Burner #1	Melt Baghouse	CU01	ST02	8.5	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU06	Refractory Burner #2	EU06	Refractory Burner #2	Melt Baghouse	CU01	ST02	8.5	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU07	Induction Furnace #1	EU07	Induction Furnace #1	Melt Baghouse	CU01	ST02	10	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU08	Induction Furnace #2	EU08	Induction Furnace #2	Melt Baghouse	CU01	ST02	10	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU09	Induction Furnace #3	EU09	Induction Furnace #3	Melt Baghouse	CU01	ST02	10	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU10	Induction Furnace #4	EU10	Induction Furnace #4	Melt Baghouse	CU01	ST02	10	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

Division for Air Quality

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
EU11	Holding Furnace #1	EU11	Holding Furnace #1	Melt Baghouse	CU01	ST02	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU12	Holding Furnace #2	EU12	Holding Furnace #2	Melt Baghouse	CU01	ST02	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU13	Transport Ladle #1	EU13	Transport Ladle #1	Melt Baghouse	CU01	ST02	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU14	Transport Ladle #2	EU14	Transport Ladle #2	Melt Baghouse	CU01	ST02	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU15	Pouring Furnace #1	EU15	Pouring Furnace #1	Melt Baghouse	CU01	ST02	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU16	Pouring Furnace #2	EU16	Pouring Furnace #2	Melt Baghouse	CU01	ST02	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU17	Melt and Core/Mold Baghouse Waste Dust Silo	EU17	Melt and Core/Mold Baghouse Waste Dust Silo	Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent	CU02	ST03	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU18	Refractory Curiing Mobile Burner	EU18	Refractory Curiing Mobile Burner	Melt Baghouse	CU01	ST02	2	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU19	Mold Silica Sand Silo	EU19	Mold Silica Sand Silo	Mold Silica Sand Silo Bin Vent	CU03	ST04	25	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU20	Blend Silo	EU20	Blend Silo	Blend Silo Bin Vent	CU04	ST05	25	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

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DEP7007N

Source Emissions Profile

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Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
EU21	Bentonite Silo	EU21	Bentonite Silo	Bentonite Silo Bin Vent	CU05	ST06	25	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU22	Mold Silica Sand Bin	EU22	Mold Silica Sand Bin	Sand Plant Baghouse	CU06	ST07	197	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU23	Blend Bin	EU23	Blend Bin	Sand Plant Baghouse	CU06	ST07	1.15	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU24	Bentonite Bin	EU24	Bentonite Bin	Sand Plant Baghouse	CU06	ST07	0.16	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU26	Mold Silica Sand Weigh Hopper	EU26	Mold Silica Sand Weigh Hopper	Sand Plant Baghouse	CU06	ST07	197	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU27	Blend Weigh Hopper	EU27	Blend Weigh Hopper	Sand Plant Baghouse	CU06	ST07	1.15	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU28	Bentonite Weigh Hopper	EU28	Bentonite Weigh Hopper	Sand Plant Baghouse	CU06	ST07	0.16	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU29	Dust Weigh Hopper	EU29	Dust Weigh Hopper	Sand Plant Baghouse	CU06	ST07	2.8	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU30	Green Sand Mixer #1	EU30	Green Sand Mixer #1	Sand Plant Baghouse	CU06	ST07	66	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

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DEP7007N

Source Emissions Profile

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Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
EU31	Green Sand Mixer #2	EU31	Green Sand Mixer #2	Sand Plant Baghouse	CU06	ST07	66	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU32	Green Sand Mixer #3	EU32	Green Sand Mixer #3	Sand Plant Baghouse	CU06	ST07	66	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU33	Mold Stamping #1	EU33	Mold Stamping #1	Core/Mold Baghouse	CU08	ST09	99	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU34	Mold Stamping #2	EU34	Mold Stamping #2	Core/Mold Baghouse	CU08	ST09	99	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU35A	Core Silica Sand Silo A	EU35A	Core Silica Sand Silo A	Core Silia Sand Silo A Bin Vent Filter	CU18	ST09	25	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU35B	Core Silica Sand Silo B	EU35B	Core Silica Sand Silo B	Core Silia Sand Silo B Bin Vent Filter	CU19	ST09	25	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU36	Sand Classifier	EU36	Sand Classifier	Core/Mold Baghouse	CU08	ST09	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU37	Core Silica Sand Bin	EU37	Core Silica Sand Bin	Core/Mold Baghouse	CU08	ST09	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU38	Core Silica Sand Weigh Hopper	EU38	Core Silica Sand Weigh Hopper	Core/Mold Baghouse	CU08	ST09	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU39	Core Machine #1	EU39	Core Machine #1	Sulfuric Acid Scrubber	CU07	ST08	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	98+% est.	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU40	Core Machine #2	EU40	Core Machine #2	Sulfuric Acid Scrubber	CU07	ST08	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	98+% est.	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

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Source Emissions Profile

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Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
EU41	Core Machine #3	EU41	Core Machine #3	Sulfuric Acid Scrubber	CU07	ST08	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	98+% est.	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU42	Core Machine #4	EU42	Core Machine #4	Sulfuric Acid Scrubber	CU07	ST08	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	98+% est.	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU43	Core Removal	EU43	Core Removal	Core/Mold Baghouse	CU08	ST09	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU44	Dryer #1	EU44	Dryer #1	Core/Mold Baghouse	CU08	ST09	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU45	Dryer #2	EU45	Dryer #2	Core/Mold Baghouse	CU08	ST09	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU46	Dryer #3	EU46	Dryer #3	Core/Mold Baghouse	CU08	ST09	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU47	Dryer #4	EU47	Dryer #4	Core/Mold Baghouse	CU08	ST09	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU48	Mold Assembly #1	EU48	Mold Assembly #1	Core/Mold Baghouse	CU08	ST09	100.9	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU49	Mold Assembly #2	EU49	Mold Assembly #2	Core/Mold Baghouse	CU08	ST09	100.9	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU50	Pouring #1	EU50	Pouring #1	Core/Mold Baghouse	CU08	ST09	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

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Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
EU51	Pouring #2	EU51	Pouring #2	Core/Mold Baghouse	CU08	ST09	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU52	Cooling Tunnel	EU52	Cooling Tunnel	Core/Mold Baghouse	CU08	ST09	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU53	Shakeout Conveyor	EU53	Shakeout Conveyor	Core/Mold Baghouse	CU06	ST07	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU54	Sand Cooler	EU54	Sand Cooler	Sand Plant Baghouse	CU06	ST07	194	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU55	Used Mold and Core Sand Storage	EU55	Used Mold and Core Sand Storage	Sand Plant Baghouse	CU06	ST07	194	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU56	Sand Screening	EU56	Sand Screening	Sand Plant Baghouse	CU06	ST07	202	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU57	Sand Plant Waste Sand Silo	EU57	Sand Plant Waste Sand Silo	Sand Plant Waste Sand Silo Bin Vent Filter	CU10	ST11	202	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU58	Mold Shop Baghouse Waste Dust Silo	EU58	Mold Shop Baghouse Waste Dust Silo	Mold Shot Baghouse Waste Silo Bin Vent Filter	CU09	ST10	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU59	Forced Air Cooler	EU59	Forced Air Cooler	Core/Mold Baghouse	CU08	ST09	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU60	Sorting	EU60	Sorting	Fettling Baghouse	CU11	ST12	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary

__ Section N.2: Stack Information

__ Section N.3: Fugitive Information

__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
EU61	Steel Shot Blasting #1	EU61	Steel Shot Blasting #1	Fettling Baghouse	CU11	ST12	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU62	Steel Shot Blasting #2	EU62	Steel Shot Blasting #2	Fettling Baghouse	CU11	ST12	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU63	Fettling Baghouse Waste Dust Silo	EU63	Fettling Baghouse Waste Dust Silo	Fettling Baghouse Wast Dust Silo Bin Vent Filter	CU12	ST13	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU64	Grinding #1	EU64	Grinding #1	Fettling Baghouse	CU11	ST12	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU65	Grinding #2	EU65	Grinding #2	Fettling Baghouse	CU11	ST12	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU66	Turning Lathes (8)	EU66	Turning Lathes (8)	Cartridge Filters CU13a - 13h	CU13a-CU13h	ST15c	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU67	Drilling and Milling (2)	EU67	Drilling and Milling (2)	Cartridge Filters CU13i - 13j	CU13i-cu13j	ST15c	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU68	Paint Booth #1	EU68	Paint Line #3	Paint Line #3 Booth Filter	CU14	ST15a	28.9	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU69	Paint Booth #2	EU69	Paint Booth #2	Paint Line #4 Booth Filter	CU15	ST15b	28.9									
EU70	Paint Booth #3	EU70	Paint Line #2	Paint Line #2 Booth Filter	CU16	ST15d	28.9	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU71	Paint Booth #4	EU71	Paint Line #1	Paint Line #1 Booth Filter	CU17	ST15c	2.38	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

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DEP7007N

Source Emissions Profile

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Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
EU72	Emergency Generator #1	EU72	Emergency Generator #1	N/A	N/A	ST73	750	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU73	Emergency Generator #2	EU73	Emergency Generator #2	N/A	N/A	ST74	750	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU74	Emergency Generator #3	EU74	Emergency Generator #3	N/A	N/A	ST75	40	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU75	Gasoline Storage Tank	EU75	Gasoline Storage Tank	N/A	N/A	N/A	2,000	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU76	Diesel Storage Tank	EU76	Diesel Storage Tank	N/A	N/A	N/A	2,000	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU77	Paved Roadways	EU77	Paved Roadways	N/A	N/A	N/A	N/K	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU78	Snag Grinder #1	EU78	Snag Grinder #1	Snag Grinder #1 Fabric Filter	CU21	ST12	N/K	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU79	Snag Grinder #2	EU79	Snag Grinder #2	Snag Grinder #2 Fabric Filter	CU22	ST12	N/K	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
ST02	Control Device ID: CU01 Emission Unit IDs: EU01, EU02, EU04,EU05, EU06, EU07, EU08, EU09,EU10	8.53	114.8	0	4072425	539906	176,538	104	51.5

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
ST02	Control Device ID: CU01 Emission Unit ID(s): EU11, EU12, EU13,EU14, EU15, EU16, EU18	8.5	114.8	0	4072425	539906	176,538	104	51.5
ST03	Control Device ID: CU02 Emission Unit ID(s): EU17	1	72.2	0	4072413	539903	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter
ST04	Control Device ID: CU03 Emission Unit ID(s): EU19	1	72.2	0	4072404	539904	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter
ST05	Control Device ID: CU04 Emission Unit ID(s): EU20	1	72.2	0	4072407	539906	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
ST06	Control Device ID: CU05 Emission Unit ID(s): EU21	1	72.2	0	4072411	539908	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter
ST07	Control Device ID: CU06 Emission Unit ID(s): EU22, EU23, EU24, EU26, EU27, EU28, EU29, EU30	6.6	131.2	0	4072396	539888	105,923	95	52.2

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
ST07	Control Device ID: CU06 Emission Unit ID(s): EU31, EU32	6.6	131.2	0	4072396	539888	105,923	95	52.2
ST08	Control Device ID: CU07 Emission Unit ID(s): EU39, EU40	2.8	85.3	0	4072517	539822	23,539	104	64.2
ST09	Control Device ID: CU08 Emission Unit ID(s): EU33, EU34, EU35A (via CU19), EU35B (via CU20), EU36-EU38	8.2	141.1	0	4072488	539816	176539	132	55.7

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
ST08	Control Device ID: CU07 Emission Unit ID(s): EU41, EU42	2.8	85.3	0	4072517	539822	23,539	104	64.2
ST09	Control Device ID: CU08 Emission Unit ID(s): EU43-EU50	8.2	141.1	0	4072488	539816	176539	132	55.7

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
ST07	Control Device ID: CU06 Emission Unit ID(s): EU53, EU54, EU55, EU56	6.6	131.2	0	4072396	539888	105,923	95	52.2
ST09	Control Device ID: CU08 Emission Unit ID(s): EU51, EU52, EU59	8.2	141.1	0	4072488	539816	176539	132	55.7
ST10	Control Device ID: CU09 Emission Unit ID(s): EU58	-	-	-	-	-	-	-	-
ST11	Control Device ID: CU10 Emission Unit ID(s): EU57	1	72.2	0	4072410	539901	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter
ST12	Control Device ID: CU11 Emission Unit ID(s): EU60	5.25	98.4	0	4072331	539832	64731	68	49.9

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
ST12	Control Device ID: CU11 Emission Unit ID(s): EU60, EU61, EU62, EU64, EU65	3.2	85.3	0	4072517	539822	105,944	68	52.22
ST13	Control Device ID: CU12 Emission Unit ID(s): EU63	6.5	141.1	0	4072488	539816	176573	132	55.7
ST15a	Control Device ID: CU14 Emission Unit ID(s): EU68	1.1	46.6	0	4072447	539710	2718	113	49.2
ST15b	Control Device ID: CU15 Emission Unit ID(s): EU69	1.1	46.6	0	4072435	539710	2718	113	49.2
ST15d	Control Device ID: CU16 Emission Unit ID(s): EU70	-	-	-	-	-	-	-	-
ST15c	Control Device ID: CU17 Emission Unit ID(s): EU66, EU67, EU71	1.1	46.6	0	4072424	539704	2718	113	49.2

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
STG1	Control Device ID: None Emission Unit ID(s): EU72	-	-	-	-	-	-	-	-
STG2	Control Device ID: None Emission Unit ID(s): EU73	-	-	-	-	-	-	-	-
STG3	Control Device ID: None Emission Unit ID(s): EU74	-	-	-	-	-	-	-	-
STTK-1	Control Device ID: None Emission Unit ID(s): EU76	-	-	-	-	-	-	-	-
ST12	Control Device ID: CU21 Emission Unit ID(s): EU78	5.25	98.4	0	4072331	539832	64731	68	49.9
ST12	Control Device ID: CU22 Emission Unit ID(s): EU79	5.25	98.4	0	4072331	539832	64731	68	49.9

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU01	Charge Handling	EU01	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU02	Alloy Storage	EU02	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU03	Scrap Drying	EU03	-	-	-	-	-	-
EU04	Scrap Cleaning	EU04	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU05	Ladle Preheater #1	EU05	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU06	Ladle Preheater #2	EU06	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU07	Induction Furnace #1	EU07	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU08	Induction Furnace #2	EU08	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU09	Induction Furnace #3	EU09	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU10	Induction Furnace #4	EU10	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU11	Holding Furnace #1	EU11	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU12	Holding Furnace #2	EU12	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU13	Transport Ladle #1	EU13	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU14	Transport Ladle #2	EU14	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU15	Pouring Furnace #1	EU15	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU16	Pouring Furnace #2	EU16	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU17	Melt and Core/Mold Baghouse Waste Dust Silo	EU17	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU18	Refractory Curiing Mobile Burner	EU18	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU19	Mold Silica Sand Silo	EU19	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU20	Blend Silo	EU20	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU21	Bentonite Silo	EU21	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU22	Mold Silica Sand Bin	EU22	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU23	Blend Bin	EU23	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU24	Bentonite Bin	EU24	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
			Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU26	Mold Silica Sand Weigh Hopper	EU26	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU27	Blend Weigh Hopper	EU27	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU28	Bentonite Weigh Hopper	EU28	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU29	Dust Weigh Hopper	EU29	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU30	Green Sand Mixer #1	EU30	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU31	Green Sand Mixer #2	EU31	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU32	Green Sand Mixer #3	EU32	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU33	Mold Stamping #1	EU33	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU34	Mold Stamping #2	EU34	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU35A	Core Silica Sand Silo A	EU35A	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU35B	Core Silica Sand Silo B	EU35B	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU36	Sand Classifier	EU36	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU37	Core Silica Sand Bin	EU37	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU38	Core Silica Sand Weigh Hopper	EU38	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU39	Core Machine #1	EU39	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU40	Core Machine #2	EU40	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

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UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU41	Core Machine #3	EU41	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU42	Core Machine #4	EU42	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU43	Core Removal	EU43	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU44	Dryer #1	EU44	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU45	Dryer #2	EU45	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU46	Dryer #3	EU46	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU47	Dryer #4	EU47	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU48	Mold Assembly #1	EU48	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU49	Mold Assembly #2	EU49	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU50	Pouring #1	EU50	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

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UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU51	Pouring #2	EU51	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU52	Cooling Tunnel	EU52	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU53	Shakeout Conveyor	EU53	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU54	Sand Cooler	EU54	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU55	Used Mold and Core Sand Storage	EU55	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU56	Sand Screening	EU56	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU57	Sand Plant Waste Sand Silo	EU57	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU58	Mold Shop Baghouse Waste Dust Silo	EU58	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU59	Forced Air Cooler	EU59	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU60	Sorting	EU60	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU61	Steel Shot Blasting #1	EU61	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU62	Steel Shot Blasting #2	EU62	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU63	Fettling Baghouse Waste Dust Silo	EU63	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU64	Grinding #1	EU64	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU65	Grinding #2	EU65	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU66	Turning Lathes (8)	EU66	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU67	Drilling and Milling (2)	EU67	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU68	Paint Booth #1	EU68	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU69	Paint Booth #2	EU69	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU70	Paint Booth #3	EU70	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU72	Emergency Generator #1	EU72	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU73	Emergency Generator #2	EU73	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU74	Emergency Generator #3	EU74	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU75	Gasoline Storage Tank	EU75	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU76	Diesel Storage Tank	EU76	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU77	Paved Roadways	EU77	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU78	Snag Grinder #1	EU78	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU79	Snag Grinder #2	EU79	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.4: Notes, Comments, and Explanations
EU01: Combine EU01 and EU02 as SCC includes all charge handling activites
EU01: Change name from Scrap Steel Storage to Change Handling to match SCC and industry norms
EU01: APCD CU01 added to address secondary capture of emissions
EU03 and EU04: Not installed at this time
EU05: Change name from Refractory Burner #1 to Ladle Preheater #1 to better identify emission unit
EU06: Change name from Refractory Burner #2 to Ladle Preheater #2 to better identify emission unit
EU05 and EU06: APCD CU01 added to address secondary capture of emissions

Section N.4: Notes, Comments, and Explanations
EU11-EU16: Change operating limit to 91,586 tpy; incorrect assumption to split 50:50
EU11, EU12 and EU15: Not installed at this time
EU11-EU16: Change maximum hourly capacity as 25.3 tph for each group; incorrect assumption to split 50:50
EU13 and EU14: Combine to a single EU ID EU13 and name "Molten Metal Transfer"
EU17: Change description from "Melt Shop Baghouse Waste Dust Silo" to "Core/Mold Baghouse Waste Dust Silo"
EU19: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU20: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU13, EU14, EU18: Added Control Device ID CU01 as secondary capture

Section N.4: Notes, Comments, and Explanations
EU21: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity.
EU21 - EU30: Combine into a single emission unit described as "Moldmaking and Sand Handling" with Emission Unit ID EU21 to match SCC description

Section N.4: Notes, Comments, and Explanations
EU31 thru EU34: Combine into a single emission unit identied as "Moldmaking and Sand Preparation (EU21)"
EU33-EU34: Change maximum hourly capacity as 197 tph for the group; incorrect assumption to split 50:50
EU35A: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU35B: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU35A and EU35B: Bin Vents (CU18 and CU19) vent inside with secondary capture via CU08 through stack ST09
EU34: Not installed at this time

Section N.4: Notes, Comments, and Explanations
EU48 thru EU49: Combine into a single emission unit identied as "Moldmaking and Sand Preparation (EU21)"
EU50-EU51: Change maximum hourly capacity to 25.3 tph for group; incorrect assumption to split 50:50
EU41, EU42,EU46, EU47, EU49: Not installed at this time

Section N.4: Notes, Comments, and Explanations
EU50-EU51: Change maximum hourly capacity to 25.3 tph for group; incorrect assumption to split 50:50
EU51 and EU58: Not installed at this time

Section N.4: Notes, Comments, and Explanations
EU61 and EU62: To match SCC, remove shot maximum hourly capacity and replace with metal hourly capacity for the group
EU64: Change name for Grinding #1 to Autogrinder #1, replace capacity with metal hourly capacity for the group
EU65: Change name for Grinding #2 to Autogrinder #2, replace capacity with metal hourly capacity for the group
EU66 and EU67: Combine and describe as "Machining " and identify as EU66
EU66-EU67: Cartridge Filters (CU13a-j) vent inside with secondary capture via Paint Line Fabric Filter stack ST15c
EU68: Change name to Paint Line #3
EU62, EU65 and E70: Emission Unit is not installed
EU69: Change name to Paint Line #2
EU71: Change name to Paint Line #1

Section N.4: Notes, Comments, and Explanations
EU75: Gasoline tank is not installed
EU77 - Change Paved Roadways from EU76 to EU77 as EU76 is already identified as the ID for the diesel storage tank.

PSD Permit Application

Document to Support Air Permit Application Correction

Fritz Winter North America LP

1 Fritz Winter Drive Franklin, Kentucky

December 2021

Mad River Strategies, LLC
08497 Plattner Road
New Bremen, OH 45869

Project 1027.003

mad river strategies llc

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Section 1
Project Introduction

1.1 Document Summary

This document provides an application to correct Air Quality Permit V-16-022 R1 (Air Permit) issued on November 25, 2017, to Fritz Winter North America LP (FWNA). The necessary corrections were identified as a result of required performance testing, air permit required monitoring and recordkeeping and a detailed review of the above identified air permit.

To reduce the resources required to review and process this application, the previous application has been used as a base document for any necessary text changes. During review of historical project information, several Kentucky Division for Air Quality (DAQ) questions, issues and concerns regarding previous applications were identified and addressed within this document. To conserve as much of the original application as possible, Figures and Tables have been consolidated into appendices.

Additional project background information is provided in this section.

1.2 Introduction

As authorized by the Air Permit, FWNA constructed and operates a gray iron foundry and machining operation to produce automotive parts, predominantly brake rotors. The facility is located in the Wilkey North Industrial Park located in Franklin, Simpson County, Kentucky. The facility is located approximately five miles north of Franklin and 13 miles south of BowlingGreen along State Route 31W.

The facility is listed under the Standard Industrial Classification (SIC) code of 3714 - Motor Vehicle Parts and Accessories. The Air Permit restricts the maximum production capacity of the foundry to 91,586 tons of molten gray iron poured per year.

1.3 Project Background

As a result of Air Permit required initial performance testing, it was determined that certain established emission limitations were not met. This section identifies the units and pollutants where emission limitations were exceeded and provides a brief analysis of likely causes.

1.3.1 Applicable Permit Limits

In addition to and in concert with other applicable sections, Section B (Foundry Operations), Section B (Coating Operations) three.c., Section D.5, Section D.7, Section G.4.e, Section G.4.h, Section G.5. and Section H.2. of Air Quality Permit V-16-022 R1 issued on November 25, 2017, includes provisions to conduct performance (emission) testing to verify compliance with permit established emission limitations.

During 2018 and prior to the installation of Control Device CU08 with Stack ST09 (identified in a format of Control Device ID/Stack ID, e.g., CU08/ST09 throughout this document), FWNA was to comply with Alternative Operating Scenario #2 provided for in Section H of the referenced air permit.

Alternative Operating Scenario #2 allowed the foundry to temporarily exhaust emission units EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59 to Baghouse CU01 (CU01/ST02) prior to the installation of CU08/ST09. Operating per Alternative Operating Scenario 2 is identified in the Air Permit as Phase 1 per the note at the bottom of the emission unit table provided in Section B (Foundry Operations).

When FWNA is conducting production activities under Alternative Operating Scenario #2, Air Permit Section H.2 (i.e., Phase 1) establishes PM, PM_{10} and $PM_{2.5}$ emission limitations for CU01/ST02 as shown in Table 1-1 provided in Appendix A (all report tables may be found in Appendix A).

Air Permit Section D.5 provides emission limitations for CU06/ST07 and CU11/ST12. These emission limits are effective when operating under Phase 1 as well as once Baghouse CU08 is installed (i.e., Phase 2).

Section D.5 also identifies PM, PM_{10} and $PM_{2.5}$ emission limitations for CU01/ST02 and CU08/ST09 during Phase 2 (once Baghouse CU08/ST09 has been installed and the exhaust ducts from emission unit IDs EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59 are moved from CU01/ST02 to CU08/ST09). [It is beneficial to note the facility continues to operate the existing coating operations under Section H. Alternative Operating Scenario #1].

Table 1-2 provides those Section D.5 identified PM, PM_{10} and $PM_{2.5}$ emission limitations during Phase 2 for CU01/ST02 and CU08/ST09 as well as PM, PM_{10} and $PM_{2.5}$ emission limitations during both Phase 1 and Phase 2 for CU06/ST07 and CU11/ST12.

Comparing Table 1-1 and 1-2 it is worth noting that CU01/ST02 PM, PM_{10} and $PM_{2.5}$ emission limitations did not change to reflect the movement of a number of particulate matter generating sources from CU01/ST02 to CU08/ST09 as the facility transitioned from Phase 1 to Phase 2 operations. Put another way, prior to transitioning to CU08/ST09, a number of units with condensable particulate matter emissions were ducted to CU01/ST02. The CU01/ST02 emission limitations were not altered to reflect the possibility of the increased condensable emissions associated with these units during Phase 1 operations.

Table 1-3 provides the volatile organic compound (VOC) and carbon monoxide (CO) emission limitations for CU1/ST02, CU07/ST08 (VOC only) and CU08/ST09. These emission limitations are effective during both Phase 1 and Phase 2. **Similar to the PM, PM_{10} and $PM_{2.5}$ issued identified above, CU08/ST09 has identified VOC and CO emissions rates that were not addressed within the emission limitations for CU01/ST02 when it was operating under Phase 1.**

Finally, Air Permit Section B.3.h. identifies performance test requirements for the Shakeout Conveyor (EU53) to determine compliance with VOC and CO BACT emission limits identified in Section B.2.e. and f. These emission limits are provided in Table 1-4 and apply during both Phase 1 and 2.

1.3.2 Initial Performance Test Results (CU01/ST02) – Phase 1

During Phase 1 the initial performance testing was conducted for the Melt Shop Baghouse (CU01/ST02) and Sand System Baghouse (CU06/ST07) in November 2018 and December 2018. Results of those tests are provided in Table 1-5 and Table 1-6 for CU01/ST02 and CU06/ST07, respectively.

The CU06/ST07 results provided in Table 1-6 assumed the only source of VOC and/or CO emissions were from the Shakeout Conveyor (EU53), and therefore any VOC and CO emissions determined at the stack were assigned to the Shakeout Conveyor (EU53).

The performance test of the CU01/ST02 yielded results that exceeded the permitted emission rates for PM_{10}, $PM_{2.5}$, VOC, and CO. **Again, as identified above, CU01/ST02 emission limitations in the Air Permit were not changed to reflect the emissions from the units temporarily ducted to CU01/ST02 during Phased 1 operations**.

The performance test of CU06/ST07 determined PM_{10} and $PM_{2.5}$ emissions exceeded applicable emission limits identified in Table 1-6 or correspondingly identified in Table 1-2.

As stated above, since CU06/ST07 was assumed to have no other sources of VOC and CO, it was inferred that those emission rates determined from testing CU06/ST07 were from the Shakeout Conveyor (EU53) and therefore indicated the Shakeout Conveyor exceeded the allowable VOC emission rate provided in Table 1-4.

1.3.3 Performance Test Results – Phase 2

Section D.5 and D.6 of the Air Permit includes provisions to repeat performance testing following completion of Phase 2 construction activities. The Phase 2 construction activities included installation of Baghouse CU08/Stack ST09 and then moving the exhaust ducts for several emission units from CU01/ST02 to CU08/ST09.

The performance test was conducted and the resulting pollutants in excess of emission limitations were $PM_{2.5}$, VOC, and CO for CU01/ST02 and $PM_{2.5}$ and VOC from CU06/ST07 and EU53, respectively. Note $PM_{2.5}$ emissions from CU01/ST02 and CU06/ST02 were only slightly above permitted limitations as was the VOC emissions from EU53.

A summary of the performance test results is provided and compared to the corresponding emission limits in Table 1-7 and Table 1-8.

1.3.4 Other Test Results

In addition to the above tests, performance tests have been conducted on Acid Scrubber CU07 (Stack ST08) and the Phase 2 installation of the Sand/Mold Baghouse CU08 (Stack ST09). Considering the results, these performance tests identified other possible Air Permit changes that could be warranted including the following:

- Acid Scrubber (CU07/ST08), test conducted November 2018, yielded emissions of CO that were unexpected with no underlying permitted emission limitations. [It is believed this is an anomaly and no change is being made to the permit application]

- Acid Scrubber (CU07/ST08), test conducted November 2018, yielded emissions of VOC that were 84% of the allowable limit. This testing was conducted at a production rate which was approximately 13% of the allowable.

1.3.5 Performance Test Results Analysis

The following provides a discussion of the likely causes of the excess emissions.

CU01 and CU06 PM_{10} and $PM_{2.5}$ Emission Limit Exceedances

From review of the above PM results, the minimal PM outlet loading indicates the baghouses are performing extremely well at removing filterable PM. The results of the performance test show the measured emission rates meet the current permit PM BACT emission limitations. Potential causes of the emissions limit exceedance include:

- The exceedances of the PM_{10} and $PM_{2.5}$ emission limitation exceedances is the results of the prior permit application's failure to address condensable particulate emissions that can occur during foundry melting, pouring, cooling and/or shakeout operations. No foundry identified in the RACT/BACT/LAER Clearinghouse (RBLC) have PM_{10} and $PM_{2.5}$ emission rates, including condensable, at these low emission rates.
- **As identified above, another reason the CU01/ST02 PM_{10} and $PM_{2.5}$ emission limitations were exceeded was a result of the additional emission units and their associated condensable particulate emissions venting to CU01/ST02 during Phase 1 while no accommodation was made in the Air Permit.**

To address this issue a revised BACT evaluation has been conducted to determine appropriate PM_{10} and $PM_{2.5}$ emission rates for these operations.

CU01/ST02, CU06/ST07 and EU53 VOC/CO Emission Limit Exceedance

There are several factors that likely led to the excess VOC and CO emission limitations from these stacks and the emission unit. Those factors include the following:

- As identified above regarding the Phase 1 PM_{10} and $PM_{2.5}$ emission limitations, the Air Permit did not consider VOC and CO emission rates from the additional emission units vented to CU01 during Phase 1 when establishing the Air Permit limits.
- Second, VOC and CO emissions vary across pouring, cooling and shakeout based on a number of factors (e.g., cooling time). When assessing compliance with VOC and CO emission limitations it is important to aggregate the performance test results across the applicable stacks and compare those results against a grouped emissions limit for the selected units. The Air Permit did not provide for this allowance.
- Third, it does not appear the VOC Shakeout BACT determination accurately reflects the expected VOC emission rate. The prior BACT identified Waupaca Foundry as having a VOC emission limit of 0.1 lb/ton of metal. A representative of Waupaca confirmed compliance cannot be demonstrated with the VOC emission limitation.
- Finally, we believe secondary capture of some emissions is occurring and being vented to these stacks resulting in greater emissions of VOC and CO.

To address the above issue a revised BACT evaluation has been conducted to determine appropriate VOC and CO emission rates for these operations. In addition, the revised Air Permit

must allow for aggregation of VOC and CO emission rates across multiple air pollution control devices to allow permit flexibility when assessing compliance at the emission unit level.

1.4 Revisions to Previous Permit Applications

Given the results of the above performance tests, the knowledge of other available foundry emissions information and the ongoing Air Permit Monitoring and Recordkeeping, this revised permit application has been prepared to address the above emission limitation exceedances. These changes are summarized in Table 1-9, 1-10 and 1-11 by comparing the expected revised emission rates and BACT to the same values provided in the current Air Permit.

Important aspects of each table can be summarized as follows:

- The largest Table 1-9 increase is a result of revisions made to the Coremaking VOC emission rates to incorporate increase emissions from resin, catalyst and/or the use of core release. A violation did not occur due to the low production rate experienced during the test. The table shows a reduction in PM and PM_{10} potential emission rates.
- Table 1-10 shows a decrease in potential emissions of PM and PM_{10} (approximately five tpy) with a slight increase in $PM_{2.5}$ emissions (approximately 10 tpy).
- Table 1-11 shows an overall potential increase in VOC and CO of approximately 43 and 22 tpy, respectively for these stacks. [note: these differences do not equate to the same change identified in Table 1-9 due to other emission units not addressed in BACT limits provided in Tables 1-10 and 1-11.

In addition to the changes identified in Tables 1-10 and 1-11, the revised application includes requests for the following changes:

- Remove several emission units identified in the initial and revised permit application that will not be installed including Scrap Drying (EU03), Scrap Cleaning (EU04), Holding Furnace #1 (EU11), Holding Furnace #2 (EU12), Mold Shop Baghouse Waste Dust Silo (EU58), Gasoline Storage Tank (EU75), and Paint Booth #3 (EU70). See Table 2-1 as referenced in Section 2.
- Change emission unit descriptions and names. See Table 2-1 as referenced in Section 2.
- Removal of BV-01A, BV-01B, BV-02A, and BV-02B as they are no longer used.
- Increase Core Release (EU39-EU42) usage to reflect usage rates;
- Increase Core Wash (EU43, EU79-EU81) usage to reflect usage rates;
- Remove shotblast media limit (EU61 and EU62) as the emission factor is based on tons of metal processed;
- Remove bentonite, silica, bond, and other usages not material to emission calculations and associated limits.
- Increase coremaking catalyst (EU39-EU42) usage to reflect potential usage rates;
- Add Rust Preventative (EU82) and Snag Grinding (EU77 and EU78) emission units.
- Change Section H, Alternative Operating Scenario 1, 1.c.Thinner (EU68 and EU69) usage to reflect operational needs.

1.5 NSR Applicability

The initial installation and subsequently issued permit estimated emissions above the Prevention of Significant Deterioration (PSD) major source threshold for carbon monoxide (CO). In addition, the

project has significant emission rates of particulate matter (PM), PM with an aerodynamic diameter of less than 10 microns (PM_{10}), and PM with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$). Revised emissions calculations now project that potential volatile organic compounds (VOCs) emissions will exceed the major source threshold.

1.6 Application Contents

This permit application includes: a process description (Section 2), a summary of the expected air emissions (Section 3), a regulatory analysis of the proposed project (Section 4), a Best Available Control Technology (BACT) analysis (Section 5), the required air quality modeling analysis (Section 6), and an assessment of other impacts (Section 7). The required Kentucky Division of Air Quality (DAQ) air permit application forms may be found in Appendix R.

Section 2
Process Description

2.1 Process Overview

The process of producing cast iron metal parts first involves fabricating a green sand mold and then filling it with molten iron. Once the metal cools and solidifies, the mold is broken to recover the cast metal part which then undergoes machining and final finishing. Figures are provided in Appendix B and Figure 2-1 provides a simplified process flow diagram of the overall foundry and machining process.

The mold making process occurs in two steps. First the outer part of the mold is formed by filling two halves of a reusable steel frame with green sand. Green sand consists of silica sand, bentonite, and a carbon blend, such as seacoal or other carbonaceous material.

Green sand is produced in the sand plant. Green sand raw materials are delivered to the facility by truck or rail and stored in silos. After both halves of the mold frame are filled with green sand, the green sand is compacted and stamped with the shape of the desired metal casting. Certain metal parts require portions of the casting to be hollow. To make these hollow sections, a separate core must be fabricated and placed in the green sand mold.

The core is subject to intense heat and stress and must be fabricated using silica sand bound by a two-part phenolic urethane binder. The core is coated with a water based abrasive resistant coating to provide additional protection during the pouring of molten metal. Once the core is placed into the bottom half of the green sand mold, the top half mold frame is placed on top of the bottom half frame and conveyed to the pouring (casting) area.

Molten gray iron is produced at the melt shop in electric induction furnaces where scrap iron and various alloys are weighed out according to the desired specifications and heated. Molten iron is then transferred into a transport ladle and moved to a pouring furnace. Here the molten iron is poured into the assembled mold. The iron filled mold is then conveyed to a cooling tunnel where the iron is allowed to cool and solidify. Once solidified, the mold is broken apart in a "shakeout" area and the metal frames are taken off and sent back to the mold assembly area for reuse. Mold and core sand is recovered and sent to the sand plant for reuse. Rough castings are further cooled by forced air and sent to the finishing area where they first go through a shot blasting (i.e., cleaning) process, followed by grinding, machining, and finally a protective zinc coating is applied.

The following sections describe the production process in more detail. Air emission units are identified with the letters “EU” followed by a unique number. Emission control units are identified with the letters “CU.” Emission points that vent to the atmosphere through a stack are identified by the letters “ST.”

Emission unit Identification numbers, descriptions and the requested description changes incorporated into this application are provided in Table 2-1.

Tables 2-2 and 2-3 identify the emission control unit and stack for each emission unit by identification number and description. These tables also provide the following information:

- Identify where emissions from a control device are captured and vented from an alternative control device stack;
- Similar to Table 2-1, identify where emission units have been combined with this application;
- Identify where an emission unit, air pollution control device and/or stack is not installed at the time of the application;
- Similar to Table 2-1, identify emission units, air pollution control devices and/or stacks that will not be installed.

2.2 Melt Shop

A process flow diagram of the melt shop operations is presented in Figure 2-2. Raw materials delivered to the melt shop for production of gray iron include; scrap steel or iron, various alloys, and fluxing agents. Raw materials are delivered to the facility by rail or truck and stored inside the building. FWNA receives scrap as a raw material. Scrap is managed per the pertinent requirements of the National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries Area Sources as codified in 40 Code of Federal Regulations (CFR) Part 63 Subpart ZZZZZZ (the Foundry Area Source Rule).

The following describes the Charge Handling emission unit (EU01). Incoming scrap is stored in bins inside the building and transferred to weigh scales for processing using an overhead crane fitted with an electromagnet. Alloys and fluxes are stored in designated areas inside the building. These additives include carbon, magnesium, molybdenum, copper, chromium, vanadium, and niobium. The alloy storage area is designed with air intakes to draw in fugitive dust and duct it to the Melt Baghouse (CU01). Alloys and additives are added manually to the furnace, according to specifications and analysis.

Induction furnaces are the cleanest form of melting iron. The scrap is melted by heat generated by passing a high amperage electric current through coils surrounding the steel jacket of the furnace. The alternating current in the coil induces an internal current in the scrap metal inside the furnace that in turn produces enough heat to melt the scrap and alloys. There are a total of four induction furnaces (EU07-EU10) with a capacity to produce 25.3 tons per hour (TPH) of molten iron. Prior to heating a pivoted ring hood is lowered over the top of the furnace that collects emissions generated during the melting process. Induction furnace emissions are vented to the Melt Baghouse (CU01) then is exhausted via stack ST02.

Flux added to the molten metal extracts impurities from the melt and forms a slag at the surface of the molten metal. Since clean scrap is used there is only a small number of impurities that need to be removed. The slag is removed from the surface of the molten iron by raising the hood slightly and using a long-handled scoop, manually skimming off the top of the molten metal. The slag is place in a small portable dumpster next to the furnace. When the iron in the induction furnace meets the specific elemental analysis and consistency, the hood is raised, and the furnace is tilted so the molten iron flows into a transport ladle.

To prepare for casting, the transport ladle is conveyed (Hot Metal Transfer – EU13) to the pouring area where the molten iron is poured from the transport ladle into one of two electrical induction pouring furnaces (EU15-EU16).

The induction furnaces, hot metal transfer and pouring furnaces are vented to the Melt Baghouse (CU01).

The pouring furnaces are equipped with small natural gas burners designed to initially heat the vessel when first brought into service from a cold start, and to keep the pouring spout hot so the molten iron does not cool against cold refractory when being poured.

Baghouse dust collected from the Melt Baghouse is conveyed to the Melt Baghouse Waste Dust Silo (EU17). The waste dust silo is equipped with a bin vent filter (CU02). The bin vent emission point is designated as ST03.

2.3 Sand Plant

There are three basic raw materials used to make the green sand mold (EU33-EU34). These are: silica sand; bentonite, which is a clay material that acts as the glue to hold the sand in the desired shape; and a carbon source, commonly a blend of bentonite and coal dust, commonly referred to as seacoal, or some other carbonaceous material which minimizes sand sticking to the iron casting. Figure 2-3 provides a process flow diagram of the sand plant.

Raw materials for the sand plant are delivered to the facility by truck and offloaded pneumatically into dedicated storage silos (EU19-EU21). Each silo has its own bin vent filter to control particulate emissions (CU03-CU05) and their associated emission points are ST04-ST06. From the silos, materials are pneumatically transferred to day bins and then to weigh hoppers . Specific proportion of each material is placed into the green sand mixers for blending. Recycled sand from the shakeout operation is also added to the green sand mixer. Most of the recovered sand from the shakeout process is recycled back into the green sand process. This equipment operates continuously and/or semi-continuously and the emissions unit is identified as Mold Sand Handling and Preparation (EU22).

Some of the sand (approximately 5%) must be purged from the mold sand system so that the residual core sand binder decomposition byproducts do not accumulate. This waste sand is sent to the waste sand storage silo (EU57) where it is later shipped off site for recycling or to a landfill. Like all other silos in the foundry the waste sand storage silo has a bin vent filter (CU10) and vents to atmosphere through emission point ST11. All of the sand system day bins, weigh hoppers and mixers are ducted to the Sand Plant Baghouse (CU06) and vents to the atmosphere through stack ST07 (see Tables 2-2 and 2-3).

2.4 Core Shop

To make the required voids and hollows in a brake rotor casting, a specially shaped, structurally sound, and dimensionally stable core needs to be fabricated and placed into the green sand mold before mold assembly and casting. Figure 2-4 provides the process flow diagram for the core shop.

Core silica sand is delivered to the facility by truck and pneumatically conveyed into one of two core silica sand storage silos (EU35A-EU35B). As required, core sand is pneumatically conveyed from a silo through a sand classifier that uses air to remove fine sized particles to produce a

uniform grain sized sand feed stream. The classified sand is then pneumatically conveyed to a sand bin for temporary storage. To make the core strong enough to remain intact during the molten iron casting process, the core must be especially strong. FWNA uses the phenolic urethane cold box (PUCB), or coldbox method of core production. In the coldbox process, silica sand from the sand bin is fed to a weigh hopper before being mixed with a two-part phenolic resin and hardener in an enclosed mixer. The sand classifier, transfer of sand-to-sand bin and then the transfer of sand to the weigh hopper comprise the Core Sand Handling and Preparation emission unit (EU36).

The blended core sand is then sent to one of four automated core machines (EU39- EU42). After the resin and sand mixture is shaped in the core machines, an amine gas (vaporized dimethyl propylamine) is injected through the porous phenolic urethane resin/ silica sand mixture. The amine acts as a catalyst to accelerate the curing time of the phenolic urethane resin. The amine gas remains unreacted and is ducted from each core machine to a common sulfuric Acid Scrubber (CU07) and vented to the atmosphere through stack ST08. The primary purpose of scrubbing out the amine gas is for odor control. In the core machines, an oil-based release agent is applied to the core stamping patterns to allow easy separation of the cores from their pattern. This material would likely be exhausted via CU07/ST08.

The hardened cores are then coated by dipping into a water based, pyrophyllite slurry, which provides additional abrasive protection which is applied in one of four coating units (EU43, EU79-EU81). The coated cores are then sent through an associate natural gas fired dryer (EU44-EU47), each with a heat input capacity of 4.0 MMBtu/hr (one of four, see Figure 2-4). Emissions from the core silica sand silos, sand classifier, sand bin, weigh hopper, core removal area and the dryers are vented to the Core/Mold Baghouse (CU08) and vented to the atmosphere through stack ST09.

2.5 Mold Assembly

The top and bottom halves of the molds, cope and drag respectively, along with the core inserts are assembled in the mold-making area (EU33-EU34).

The mold assembly process starts with an outer metal frame onto which a release agent is applied before the frame is filled and compacted with green sand. The outer shape of the desired casting is then stamped into both the cope and drag of the green sand (Mold Making #1 and Mold Making #2). Cores are placed into the bottom half of the molds before the top halve of the mold is placed on the bottom half to form one complete sealed mold. The mold is then conveyed to the pouring furnaces. Emissions generated from the mold assembly area are ducted to the Core/Mold Baghouse (CU08) which exhausts to the atmosphere through stack ST09.

2.6 Pouring, Cooling and Shakeout

The pouring, cooling, and shakeout (PCS) process is presented in the process flow diagram in Figure 2-5. The three PCS operations occur along one continuous conveyor line. At the pouring stations (EU50-EU51) molten iron from the pouring furnace is transferred into the assembled molds that are brought to the furnace on a rail system.

The molds are designed to allow the molten iron to be poured into one fill port. Due to the extreme heat contacting the carbon in the mold and the resin in the core, CO and volatile organic compounds (VOCs) are generated. Vents throughout the mold allow hot gases produced during

the pouring process to escape which typically auto ignite. To enhance the autoignition process, natural gas mold vent pilot burners are strategically placed at the mold conveyor to ignite the vent gases that have not already ignited.

The casted molds are then conveyed through a cooling tunnel (EU52) to allow controlled cooling of the molten iron to form the required metal crystalline structure. Emissions from the pouring stations and cooling tunnel are routed to the Core/Mold Baghouse (CU08) and exhausts to the atmosphere through stack ST09.

Once the iron castings solidify, the mold frames are opened, and the sand mold enters the shakeout conveyor (EU53) where the molds are broken, and the castings separated from the mold and core sand. Emissions from the shakeout conveyor are vented to the Sand Plant Baghouse (CU06) which is vented to the atmosphere through stack ST07.

The sand falls onto a conveyor that returns the sand to the Sand Plant. Before returning to the Sand Plant, the used mold and core sand runs through a sand screening sieve and a sand cooler where air and water are applied to obtain the desired cooling effect and moisture content. The recycled sand is then transferred to storage where it is blended again with other raw materials to make new green sand. This equipment is all part of the Mold Sand Handling and Preparation emission unit (EU22).

Due to impurities in the sand generated from heating the resin-based core sand and carbon in the green sand, some of the recycled sand must be taken out of the sand system and disposed of. Sand destined for a landfill is temporarily stored in the Sand Plant Waste Sand Silo (EU57). Emissions from the sand screen sieve, sand cooler, used sand storage is ducted to the Sand Plant Baghouse (CU06) and vented through stack ST07. Dust generated from the Waste Sand Silo (EU57) is filtered by a silo bin vent (CU10) before exhausting to the atmosphere through stack ST11.

The shakeout conveyor also breaks away the sprues from the casting which are separated and sent back to the melt shop as internal scrap. The castings are conveyed to the Forced Air Cooler (EU59) before entering the finishing stage. The air used to cool the castings is a mixture of recycled air leaving the cooling tunnel and fresh makeup air. Exhaust from the Forced Air Cooler (EU59) is routed to the Core/Mold Baghouse CU08.

2.7 Finishing

The finishing process is presented in Figure 2-6. After the castings are cooled in the forced air cooler, the parts are sorted at the Sorting Conveyor (EU60) to remove any remaining sprues and sent through one of two abrasive steel shot blasting units (EU61-EU62) to remove any remaining sand and to smooth the casting surface. Parts then enter one of two grinding stations (EU64-EU65) which removes any remaining sprue or raised surface from the casting. Also, one of two snag grinders (EU77-EU78) may be used for removing metal from the castings. The Sorting Conveyor, shot blasting units and grinders are ducted to the Fettling Baghouse CU11 which vents to the atmosphere through stack ST12. Dust from the Fettling Baghouse is conveyed to the Fettling Baghouse Waste Dust Silo (EU63) whose emissions are controlled by the Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12) via stack ST13.

Snag Grinder #1 and #2 each of their own fabric filters (CU21, CU22) that vent inside the building. Any emissions from these stacks would be captured by the Fettling Baghouse (CU11) and vented through stack ST12.

Finished castings are sent to short term storage to allow the gray iron to fully crystallize before being sent to the final machining operation.

In the machine shop, a series of computerized Machining Lines (EU66) and a Perforation Line (EU67) machine each casting to the correct specifications and tolerances. Particulate emissions generated from the dry lathes, drilling, and milling machines are ducted to a series of fabric filters (CU13a-CU13j) that vent into the building. Emissions from these fabric filters are presumed to vent to atmosphere through stack ST16 which exhausts from the Paint Line #1 Booth Filter. Iron chips generated from the dry lathe, milling and drilling operations are collected as scrap steel and sent back to the melt shop and reused as internal scrap.

A low-VOC content rust preventative may be applied to the casting prior to storage (EU82).

2.8 Painting

The painting operations are shown in Figure 2-6. Before shipping, each brake rotor is coated with a zinc coating. Two types of zinc coating operations are used. In one coating process, castings enter one of two lines, Paint Line #3 or Paint Line #2 (EU68-EU69), each consisting of an induction heating unit followed by a paint booth, then a cooling unit.

In an alternative type of coating, castings enter Paint Line #1 (EU71) which applies a solids-based coating, followed by a preheater and final induction heater to cure the zinc coating.

All three paint lines are fitted with individual filters (CU14-CU15 and CU17, respectively) and ducted to stacks ST15A, ST15B and ST16, respectively.

2.9 Utilities

Utility operations are presented in Figure 2-7. The refractory lining of the ladles and furnaces are subjected to extreme wear and stress throughout the casting process and has to be routinely replaced. Refractory relining of the induction furnaces, holding furnaces and pouring furnaces must be conducted in place. The new refractory lining is installed into a furnace by inserting a mold into the furnace and filling the space between the mold and the furnace wall with a refractory slurry. To cure the refractory lining, the mold inserts are removed once the refractory has set, and a portable natural gas burner (EU18) is lowered into the furnace and the heat cures the new refractory lining.

Relining transport ladles is accomplished in the refractory repair area in a same manner using a mold insert and portable natural gas burners (EU05-EU06). The estimated heat input capacity of each refractory curing burners is 8.5 MMBtu/hr.

Three diesel fired emergency generators (EU72-EU74) provide backup emergency electrical in the event of a main electrical supply power failure.

A 1,000 gallon above ground diesel storage tank (EU75) located on site used to refuel company vehicles. Other liquid chemicals are received and stored in totes and drums.

Section 3
Emission Calculations

3.1 Emission Calculations

This section describes how potential emissions from the proposed project are calculated. Detailed calculations of the emissions are provided in Appendix C and a summary table of the resulting hourly and annual emissions are shown in Table 3-1 and Table 3-2.

The emission unit-level calculations provided in Appendix C include footnotes that identify sources of emission factors as well as provide examples of the emission calculation methodology. Appendix D and S provides safety data sheets and other sources of emissions information, respectively.

To determine particulate matter emissions the calculation methodology generally includes using maximum stack outlet grain loading and anticipated maximum air volumes.

Gaseous criteria pollutant emission and organic HAP emission rates are determined via emission factors determined during site specific performance testing, testing conducted by material vendors or from other sources.

3.2 Particulate Emission Calculations

The majority of the emissions sources are sources of filterable particulate. These emissions are either sand or dust particles generated in the casting operation or metal dust generated in the melt shop or finishing areas. In either case the emissions are generally controlled by filters/baghouses.

Exhaust air from any of the fabric filters will not exceed 0.003 grains per dry standard cubic foot (gr/dscf) (vendor guarantee). This exit grain loading is justified in the Best Available Control Technology (BACT) section of the application (Section 5) and is used to calculate the particulate emissions from these sources when multiplied by the maximum design flowrate of air leaving the baghouse operating 8,760 hours per year (maximum potential).

Condensable particulates may be present in exhaust streams from the melting furnaces, pouring, mold cooling and shakeout (PCS) operations (due to the incomplete combustion of or organic materials in the mold and/or core) in addition to natural gas-fired burners. Condensable particulates were considered when establishing the above outlet grain loadings.

There are several locations throughout the process that particulate emissions are emitted such as the induction furnaces, pouring stations, grinding stations and conveyor systems. Where these emissions are controlled by a baghouse, ductwork and hooding are designed to customary engineering standards to ensure emissions from a unit are collected into a primary or secondary hood capture system and do not escape into the workplace atmosphere.

3.3 Gaseous Criteria Pollutants and Organic HAP Emission Calculations

The primary emissions of HAP's, VOC and CO come from the PCS operation due to incomplete combustion of gases generated during pouring of the hot iron into the mold and oxidizing the carbon in the green sand mold and the organic binder present in the core.

To estimate emissions from the PCS process and from the core shop, we relied primarily on the published work from the Casting Emission Reduction Program (CERP). CERP is a consortium of both industry and government (EPA) groups formed to develop accurate emission factors for this industry as well as investigate means of reducing these emissions. It was formed in the 1990s and has published work through 2007.

Although FWNA installed equipment, which on an hourly basis can process 25.3 tons/hr of metal in the melt shop and mold line, this rate of production is not sustainable due to the high maintenance required for this type of equipment. Therefore, FWNA has accepted a federally enforceable production cap of 91,586 tons/yr of metal production which exceeds their sales projections through the year 2025. Therefore, using this production level and the CERP emission factors, it was determined that the facility is a minor source of HAPs

The paint contains both HAPs and VOC. Calculation of emissions of these pollutants was based on the usage of paint per part and a maximum of approximately 3,500,000 parts per year. The safety data sheets (SDSs) identified the contents of these paints which was used to make these emission estimates. SDS for major raw materials are included in Appendix D.

Section 4
Regulatory Analysis

4.1 Prevention of Significant Deterioration (PSD)

The FWNA iron foundry and machining operations are located in Simpson County, Kentucky which is an attainment area for all criteria pollutants. The air quality in neighboring counties is also in attainment with National Ambient Air Quality Standards (NAAQS).

The FWNA foundry is presumed one of the 28 PSD source categories and one hundred tpy of emissions of any PSD regulated pollutant (PM_{10}, NO_x, CO, SO2, or VOC) designates the facility as a major source under PSD.

As identified in Table 1-9, the foundry has the potential to emit over one hundred tpy of CO and VOC therefore the facility is designated as a major source and the foundry construction was subject to PSD review.

Once the facility is designated as a major source other pollutants are evaluated to determine if emissions exceed their respective significant emission rates (SER). As shown in Table 1-9 SERs are exceeded for PM, PM_{10}, and $PM_{2.5}$. As a result, PM, PM_{10}, $PM_{2.5}$, CO and VOC are subject to PSD review.

This section reviews other potential applicable regulations.

4.2 National Emission Standards for Hazardous Air Pollutants (NESHAPs)

4.2.1 NESHAPS for a minor source of HAP (40 CFR 63 Subpart ZZZZZ-NESHAP for Iron and Steel Foundries Area Sources):

The rule provides emission limitations and work practices for both small foundries and large foundries. The FWNA foundry is a large foundry as defined by the rule. In summary this NESHAP requires the iron foundry to:

1) Develop a scrap management program that ensures no mercury switches are present in the scrap;
2) The scrap cannot contain chlorinated plastic material, and must be free of liquids, engine blocks, or oil filters;
3) Methanol cannot to be used in the green mold process;
4) Particulate matter cannot exceed 0.1 pound per ton of metal processed from the furnace operation;
5) Opacity cannot exceed 20% from the furnace baghouse; and
6) All process baghouses for affected units must be monitored with a baghouse leak detector.

4.2.2 NESHAPS for a major and minor sources of HAP (40 CFR 63 Subpart ZZZZ-NESHAP for Stationary Reciprocating Internal Combustion Engines RICE)):

This subpart regulates HAP emissions from RICE located at major sources and area sources of HAP. FWNA installed three emergency generators and therefore is subject to this subpart. The rule requires compliance with NSPS IIII and limits non-emergency operation to less than one hundred hours per year.

4.2.3 Subpart CCCCCC—National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Dispensing Facilities

This rule regulates gasoline storage tanks at area sources by imposing certain emission limits and management practices. FWNA no longer plans to install a gasoline tank and therefore this rule is not applicable.

4.2.4 Subpart XXXXXX—National Emission Standards for Hazardous Air Pollutants Area Source Standards for Nine Metal Fabrication and Finishing Source Categories

This rule regulates various metal product industries requiring certain operational practices that would reduce metal HAP emissions. The rule is not applicable to the FWNA foundry because its operation does not fit any category described in Table 1 of the rule.

4.2.5 Subpart HHHHHH—National Emission Standards for Hazardous Air Pollutants: Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources

This rule applies to area sources where surface coating of metal occurs, which does apply to the FWNA foundry. However, the rule focuses on regulating emissions of certain HAP metals namely, Chromium, Lead, Manganese, Nickel or Cadmium. The coating used at the FWNA finishing operations will be a zinc coating and does not contain any of these metals, at least not to the degree that makes it applicable to the rule (<0.1% for each metal). FWNA will continue to document that all coatings used has metal content less than this concentration.

4.3 New Source Performance Standards (NSPS)

4.3.1 40 CFR 60 Subpart Z—Standards of Performance for FerroalloyProduction Facilities

40 CFR 60 Subpart Z, Section §60.260 - Applicability and designation of affected facility:
(a) The provisions of this subpart are applicable to the following affected facilities: Electric submerged arc furnaces which produce silicon metal, ferrosilicon, calcium silicon, silicomanganese zirconium, ferrochrome silicon, silvery iron, high-carbon ferrochrome, charge chrome, standard ferromanganese, silicomanganese, ferromanganese silicon, or calcium carbide; and dust-handling equipment.

Since the FWNA foundry utilizes electric induction furnaces to melt scrap steel and keep the iron molten and not arc furnaces this rule does not apply.

4.3.2 40 CFR 60 Subpart IIII - Standards of Performance for StationaryCompression Ignition Internal Combustion Engine

This rule was finalized on July 11, 2006. It provides performance standards for diesel stationary compression ignition (CI) engines, including emergency engines that commence reconstruction or modification after the proposal date of July 11, 2005, or construction of a new engine after April 1, 2006. The rule provides performance standards for both engine manufacturers and operators. Engine operators must meet the specified emission standards and fuel type specifications in the rule. FWNA has installed three emergency generators and therefore FWNA is subject to this subpart. Other than required for maintenance purposes, these generators only operates when there is a power outage at the facility. The engines to be purchased for the project are in compliance with 40 CFR 60.4202 which specifies required emission standards for emergency engines. The engines will continue to be limited to run a total of one hundred hours per year of non-emergency operation.

4.4 State Specific Rules

The FWNA facility is located in Simpson County, which is in the Commonwealth of Kentucky, South Central Kentucky Intrastate Air Quality Control Region.

Several state specific rules that are potentially applicable to this facility.

4.4.1 401 KAR 51:010 Attainment Status Designations

The FWNA facility is located in Simpson County which has air quality standards for all regulated pollutants that are “Better than standard” and the county is not subject to additional non-attainment compliance requirements.

4.4.2 401 KAR 51:017. Prevention of Significant Deterioration of Air Quality.

The facility’s PTE emissions are such that the facility is subject to this regulation. The facility will continue to comply with this regulation.

4.4.3 401 KAR 52:020. Title V Permits.

The facility’s PTE emissions are such that the facility is subject to this regulation. The facility will continue to comply with this regulation.

4.4.4 401 KAR 52:050. Permit Application Forms.

The facility will complete Kentucky "Forms DEP7007AI to DD, Permit Application to Construct or Operate an Air Contaminant Source" as found in this permit application.

4.4.5 401 KAR 55:005. Significant Harm Criteria.

The purpose of this chapter is designed to prevent ambient pollutant concentrations at any location from reaching the following levels which could cause significant harm to the health of persons. The FWNA facility will continue to comply with this requirement.

4.4.6 401 KAR 55:020. Abatement Strategies.

The FWNA facility will prepare, when requested by the director in writing, standby plans for reducing the emission of air pollutants during episode periods (air pollution alert, warning, and emergency). Standby plans shall be designed to reduce or eliminate emission of air pollutants in accordance with the objectives set forth in Sections 2 to 4 of this administrative regulation.

4.4.7 CFR Part 61 National Emission Standards for Hazardous Air Pollutants.

The FWNA facility does not emit pollutants regulated under 40 CFR 61.01 through 61.139 and 61.160 through 61.358, Subparts A through L and N through FF and is therefore not subject to this regulation.

4.4.8 401 KAR 59:005. General Provisions.

The provisions of this chapter apply to the owner or operator of any new source for which a standard of performance has been promulgated. The FWNA facility will continue to comply with the requirements of this chapter, including Performance Tests, Notification and Recordkeeping, and Monitoring Requirements.

4.4.9 401 KAR 59:010. New Process Operations.

The provisions of this administrative regulation apply to each affected facility or source, associated with a process operation, which is not subject to another emission standard with respect to particulates in this chapter. The FWNA facility will continue to comply with the following Standard for Particulate Matter.

(1) Opacity standard: No person shall cause, suffer, allow, or permit any continuous emission into the open air from a control device or stack associated with any affected facility which is equal to or greater than twenty (20) percent opacity.

(2) Mass emission standard: For emissions from a control device or stack no person shall cause, suffer, allow or permit the emission into the open air of particulate matter from any affected facility which is in excess of the quantity specified in Appendix A to this administrative regulation.

Interpolation of the data for process weight rates up to 60,000 lb/hr shall be accomplished by use of the equation:

$$E = 3.59P^{0.62}$$

and interpolation and extrapolation of the data for process weight rates in excess of 60,000 lb/hr shall be accomplished by the use of the equation:

$$E = 17.31P^{0.16}$$

Where: E = rate of emission in lb/hr and P = process weight rate in tons/hr.

The FWNA facility will continue to comply with the requirements of this regulation.

4.4.10 401 KAR 59:050. New Storage Vessels for Petroleum Liquids.

This rule requires specific performance standards for operation of petroleum storage tanks. It applies only if the total storage is greater than 40,000 gallons. Since the FWNA facility will store less than that, this rule does not apply.

4.4.11 401 KAR 59:105. New Process Gas Streams.

The provisions of this administrative regulation shall apply to each affected facility which means any process gas stream which is not elsewhere subject to a standard of performance within this chapter with respect to hydrogen sulfide, sulfur dioxide, or carbon monoxide.

The FWNA facility does not generate a waste gas stream containing hydrogen sulfide or sulfur dioxide. As regards to CO, the rule only applies if the facility emits more than 1,000 tpy of CO and is in a non-attainment area. Neither of these conditions are true and therefore FWNA is not subject to this regulation.

4.4.12 401 KAR 59:225. New Miscellaneous Metal Parts and Products Surface Coating Operations.

The FWNA facility is an "Affected facility" as it has a coating line located at an original equipment manufacturing industry which applies coatings to metal substrates not elsewhere subject to administrative regulation, and the facility is located in a county designated attainment for ozone in 401 KAR 51:010.

Standard for VOCs: No person shall cause, allow, or permit an affected facility to discharge into the atmosphere more than fifteen (15) percent by weight of the VOCs net input into the affected facility.

The FWNA facility is exempted from this regulation based on the following:

> (b) Less than 0.42 kg/l of coating (three and five-tenths (3.5) lb/gal). The VOC content of FWNA coatings is: 3.4 lb/gal or less.

4.4.13 401 KAR 60:005. 40 CFR Part 60 standards of performance for new stationary sources.

The FWNA facility is subject to the NSPS rules discussed in Section 4.3.

4.4.14 401 KAR 63:002. 40 CFR Part 63 national emission standards for hazardous air pollutants.

The FWNA facility is subject to the NESHAPs discussed in section 4.2.

4.4.15 401 KAR 63:005. Open burning.

This administrative regulation establishes requirements for the control of open burning. The FWNA facility will continue to comply with the requirements of this regulations.

4.4.16 401 KAR 63:010. Fugitive Emissions.

Under this Standards for Fugitive Emissions. (1) No person shall cause, suffer, or allow any material to be handled, processed, transported, or stored; a building or its appurtenances to be constructed, altered, repaired, or demolished, or a road to be used without taking reasonable precaution to prevent particulate matter from becoming airborne; (2) No person shall cause or permit the discharge of visible fugitive dust emissions beyond the lot line of the property on which the emissions originate; (3) When dust, fumes, gases, mist, odorous matter, vapors, or any combination thereof escape from a building or equipment in such a manner and amount as to cause a nuisance or to violate any administrative regulation, the secretary may order that the building or equipment in which processing, handling and storage are done be tightly closed and ventilated in such a way that all air and gases and air or gas-borne material leaving the building or equipment are treated by removal or destruction of air contaminants before discharge to the open air.

In addition, (3) at all times when in motion, open bodied trucks, operating outside company property, transporting materials likely to become airborne shall be covered, and; (4) No one shall allow earth or other material being transported by truck or earth moving equipment to be deposited onto a paved street or roadway.

The FWNA facility will continue to comply with the requirements of this regulation and in addition will continue to ensure that all internal roadways used for truck traffic are paved and these roadways cleaned on a regular basis.

4.4.17 401 KAR 63:020. Potentially Hazardous Matter or Toxic Substances.

FWNA is subject to the provisions of this administrative regulation because it emits or may emit potentially hazardous matter or toxic substances, provided such emissions are not elsewhere subject to the provisions of the administrative regulations of the Division for Air Quality.

FWNA will continue to control potentially hazardous matter and toxic substances. It will not allow the facility to emit potentially hazardous matter or toxic substances in such quantities or duration as to be harmful to the health and welfare of humans, animals, and plants. The FWNA facility will continue to comply with the requirements of this regulation as shown in Section 6 of this document.

4.4.18 401 KAR 68:010. Chemical Accident Prevention - General provisions.

The FWNA facility does not store or use chemicals in quantities which make them subject to Federal regulation 40 CFR Part 68 - General provisions for chemical accident prevention and risk management. Therefore, this regulation does not apply to the facility.

Section 5
BACT Analysis

5.1 Changes from Prior Application

As discussed in Section 1, this document provides an application to correct Air Quality Permit V-16-022 R1 (Air Permit) issued on November 25, 2017, to Fritz Winter North America LP (FWNA). The necessary corrections to the Air Permit were identified as a result of required performance testing, Air Permit required monitoring and recordkeeping and a detailed review of the Air Permit.

The revised permit application has been prepared to address a number of issues including necessary changes to raw material usages and emission limitations. **When compared to the previous application, the requested change in total emissions by this application is approximately the following:**

- PM emissions decrease 9 tpy
- PM_{10} emissions decrease 13 tpy
- $PM_{2.5}$ emissions increase 3.5 tpy
- SO_2 emissions decrease less than 1 tpy
- NO_x emissions decrease 10 tpy
- VOC emissions increase of 33 tpy
- CO emissions increase of 15 tpy
- Lead emissions decrease of less than 0.5 tpy.

Viewing the pollutants collectively, the above emission changes result in an overall increase in criteria pollutants of approximately 27 tpy from the previous application. With the limited emissions change, there is limited changes to the previous BACT determinations as identified in Tables 1-10 and 1-11.

As shown in Table 1-10, BACT emission rates changes for PM and PM_{10} resulted in a decrease in approximately 5 tpy, while $PM_{2.5}$ emissions increased by 10 tpy. These emission changes are substantially the result of the inclusion of expected condensable particulate matter necessitating the following changes:

- CU06/ST07 $PM_{2.5}$ emission increase from 0.0015 to 0.0025 gr/dscf;
- CU08/ST09 $PM_{2.5}$ emission increase from 0.0015 to 0.002 gr/dscf; and
- CU11/ST12 $PM_{2.5}$ emission decrease from 0.0015 to 0.001 gr/dscf.

Similar to Table 1-10, Table 1-11 identifies VOC emission increases over current levels of approximately 43 tpy. The increase associated with VOC emissions are the result of the following changes:

- For Electric Induction Furnaces (EU07 through EU10), the addition of process VOCs emissions and/or secondary capture (in addition to combustion emissions identified in the original application) resulting in an increase from 0.61 to approximately 5 tpy.
- For Pouring (EU50/EU51) and Mold Cooling (EU52), an emission factor change increased emissions from 17.3 to approximately 23 tpy.

- For Shakeout (EU53), as will be discussed below, correcting the emission factor results in an increase from 4.58 to approximately 24 tpy.
- For PUCB Coremaking #1 through #4 (EU39-EU42) correcting emission factor and increasing material usage increased emissions from 1.6 to approximately 33 tpy.
- For Core Wash Station #1 through #4 (EU43, EU79, EU80, EU81), the annual usage increase from 233.2 to 540 tpy resulted in an increase in emissions from 1.7 to approximately 4 tpy.

Table 1-11 shows overall CO potential emissions increase of 22.61 tpy. This CO emissions increase is predominantly resulting from additional process emissions or secondary capture (in addition to combustion emissions identified in the original application) at the Electric Induction Furnaces (EU07 through EU10). This increases the CO emissions 9.3 to approximately 23 tpy at CU01/ST02.

Given the limited emissions increase identified above and absence of new technology and/or work practices for the pollutants of concern, there are no significant changes to the BACT analysis previously submitted as discussed in the following sections.

5.2 BACT Introduction

Sources undergoing a PSD review must apply BACT to any new or modified emission unit that emits a PSD-triggered pollutant. Federal PSD regulations define BACT as:

… an emission limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Clean Air Act, which would be emitted from any proposed major stationary source or major modification, which the administrator on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of each such pollutant.

The determination proceeds to state that no BACT determination may be less stringent than the applicable NSPS, NESHAP, or State Implementation Plan (SIP) limits. Also, the definition allows a design or work practice to be established as BACT.

On December 1, 1987, the US EPA Assistant Administrator for Air and Radiation issued a memorandum that implemented certain program initiatives designed to improve the effectiveness of the New Source Review (NSR) programs in the confines of existing regulations and SIPs. Among these was the "top-down" method for determining BACT. The top-down process provides that available control technologies be ranked in descending order of control effectiveness. The first step of this process is to evaluate the most stringent or "top" alternative. This represents BACT, unless it can be demonstrated, and the permitting authority agrees, that technical considerations, energy, environmental, or economic impacts justify a conclusion that the most stringent technology is not "achievable" in a particular case. If the most stringent technology is eliminated in this fashion, then the next most stringent alternative is considered, and so on, until the most appropriate control strategy is selected for each source.

BACT is required for any emission unit that emits a PSD-regulated pollutant above the respective significant emission rate (SER). Table 5-1 identifies PSD-regulated pollutants exceeding the SER as particulate matter (PM), particulate matter equal to or less than 10 microns in diameter (PM_{10}), particulate matter equal to or less than 2.5 microns in diameter ($PM_{2.5}$), volatile organic compounds

(VOCs) and carbon monoxide (CO). These are the same pollutants identified in the prior air permit applications.

5.3 Study Methodology

The requirement to conduct a BACT analysis is provided for in 401 KAR 51:107 Section 8 (2) and states a "new major stationary source shall apply BACT for each regulated NSR pollutant for which the source has the potential to emit in significant amounts."

401 KAR 51_001 Section 1(25) defines BACT as "an emissions limitation, including a visible emission standard, based on the maximum degree of reduction for each regulated NSR pollutant that will be emitted from a proposed major stationary source or major modification and:

(a) Is determined by the cabinet pursuant to 401 KAR 51:017, Section 8, after considering energy, environmental, and economic impacts and other costs, to be achievable by the source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of that pollutant;
(b) Does not result in emissions of a pollutant that would exceed the emissions allowed by an applicable standard codified in 40 C.F.R. Parts 60 and 61; and
(c) Is satisfied by a design, equipment, work practice, or operational standard or combination of standards approved by the cabinet, if:
    1. The cabinet determines pursuant to 40 C.F.R. 51.166(b)(12) that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible;
    2. The standard establishes the emissions reduction achievable by implementation of the design, equipment, work practice, or operation; and
    3. The standard provides for compliance by means that achieve equivalent results.

From the definition above, BACT is "an emission limitation," not an emission reduction rate or a specific technology. BACT is determined on a case-by-case basis and therefore does not require the installation of any specific control device. While BACT is prefaced upon the application of technologies reflecting the maximum reduction rate achievable, the result of BACT is as stated above "an emission limit."

In addition, the above BACT definition identifies that in cases where the implementation of an emission limitation is deemed infeasible, "…a design, equipment, work practice, or operation" may be prescribed as a BACT standard."

BACT is to be established at the lowest value that is achievable. However, there is an important distinction between emission rates achieved at a specific time on a specific unit, and an emission limitation that a unit must be able to meet continuously over its operating life. DC Circuit Court of Appeals, in National Lime Association v. EPA, 627 F.2d 416, 431 n.46 (D.C. Cir. 1980), stated that where a statute requires that a standard be "achievable," it must be achievable "under most adverse circumstances which can reasonably be expected to recur."[1]

[1] Sierra Club v. USEPA (97-1686)

Similar conclusions have been made by USEPA in previous PSD permits. USEPA has stated "Agency guidance and our prior decisions recognize a distinction between, on the one hand, measured 'emissions rates,' which are necessarily data obtained from a particular facility at a specific time, and on the other hand, the 'emissions limitation' determined to be BACT and set forth in the permit, which the facility is required to continuously meet throughout the facility's life. Stated simply, if there is uncontrollable fluctuation or variability in the measured emission rate, then the lowest measured emission rate will necessarily be more stringent than the "emissions limitation" that is "achievable" for that pollution control method over the life of the facility. Accordingly, because the "emissions limitation" is applicable for the facility's life, it is wholly appropriate for the permit issuer to consider, as part of the BACT analysis, the extent to which the available data demonstrate whether the emissions rate at issue has been achieved by other facilities over a long term."[2]

It follows from above that BACT should be established at the lowest feasible emission rate recognizing that the emission unit must comply with the emission rate or limit on a continuous basis for the life of the unit or air permit. It follows then that any actual performance data gathered for an emission unit must be viewed carefully, as rarely will the data be adequate to truly assess the performance that a unit will achieve during its entire operating life. While statistical variability of actual performance can be used to infer what is "achievable," such testing requires a significant effort compiled over a significant period and that robust of a dataset is usually and largely unavailable at the time of the BACT analysis.

The BACT review is conducted using USEPA's prescribed "Top Down" method as outlined in the 13 October 1989 guidance document, "Transmittal of Background Statement on Top Down Best Available Control Technology (BACT)", issued by John Calcagni, Director, the United States Environmental Protections Agency's (USEPA's) Air Quality Management Division. The details of the study were compiled in accordance with the guidance, "Improving New Source Review Implementation," 1 December 1987, from J. Craig Potter, USEPA's Assistant Administrator for Air and Radiation, and the accompanying document "Best Available Control Technology Guidance Document, EPA Region 9, April 1987."

The following sections of the analysis present the "top-down" BACT analysis for each pollutant that exceeded the SER and is specific to each emission unit, unless otherwise specified. The five steps in such an evaluation can be summarized as follows:

Step 1. Identify all possible control technologies;
Step 2. Eliminate technically infeasible control options;
Step 3. Rank the technically feasible control technologies based upon emission reduction potential;
Step 4. Evaluate ranked control technologies based on energy, environmental, and/or economic considerations; and
Step 5. Select BACT.

The above process is typically conducted on a unit-by-unit, pollutant-by-pollutant basis. While the top-down BACT analysis is a procedural approach suggested by USEPA policy, this approach is not specifically mandated as a statutory requirement of the BACT determination. The BACT analysis has been evaluated via this "top-down" approach. The "top-down" will be further discussed below.

[2] U.S. EPA Environmental Appeals Board decision, Newmont Nevada Energy Investment L.L.C. PSD Appeal No. 05-04, decided December 21, 2005. Environmental Administrative Decisions, Volume 12, Page 442.

Economic considerations identified in Step 4 above were completed in accordance with Office of Air Quality Planning and Standard's Control Cost Manual. Supporting documentation for capital and installation costs utilized in the analyses is included in the appendices of this document.

5.4 Emission Units and Pollutants

As discussed above, BACT is required for any emission unit that emits a PSD-regulated pollutant above the respective significant emission rate (SER) with Table 5-1 identifying those regulated pollutants exceeding the SER as PM, PM_{10}, $PM_{2.5}$, VOCs, and CO.

Table 5-2 identifies each unit-that emits a PSD regulated pollutant. Because the emission rates for most PM, PM_{10} and $PM_{2.5}$-generating emission units are quantified at the stack level (see bottom of Table 5-2), Tables 2-2 and Table 2-3 provides a cross reference of Air Pollution Control Device (APCD) ID/Stack ID to Emission Unit ID and Emission Unit Name, respectively, allowing identification of all emission units subject to BACT due to their particulate emissions.

A summary of Emission Unit ID, Emission Unit Description and identification of pollutant emitted by each operation is provided in Table 5-3.

5.5 Analysis Introduction and Prioritization

The first step in conducting the analyses was to identify current emission reduction technologies and determine which operations would most likely be cost-effective to control. Therefore, a review of the RBLC was completed to identify similar operations, already in existence, using add-on controls for PM, PM_{10}, $PM_{2.5}$, VOC, and CO emissions.

The above review found several determinations for PM, PM_{10}, and $PM_{2.5}$ emission sources. Most of the determinations included the installation of a baghouse. As previously mentioned, no pouring, mold cooling, and shakeout operations were found in the RBLC using a CO and/or VOC emissions control device (excluding mold vent light-off). In addition, based on a review of the RBLC and several state permits, no PUCB core- making or mold-making operations were identified as utilizing VOC controls other than an acid scrubber for amine catalyst emissions control.

The review of the RBLC found only VOC emission control devices installed on melting (Electric Arc Furnaces (EAFs) and Cupolas). EAFs and cupolas are more significant sources of VOCs, when compared to an Electric Induction Furnace as installed and used at FWNA.

A major concern when evaluating the feasibility of emissions controls on pouring, mold cooling, and shakeout was the fact that to date no CO and/or VOC control devices were found installed on any of these operations. Given this fact and considering the potential generation of partially oxidized organic compounds and the potential formation of condensation, any control technologies must be carefully evaluated.
Also, from discussions with air pollution control device (APCD) vendors, in the event of a baghouse failure, a secondary filter system would be necessary to capture PM emissions prior to any "regenerative" VOC/CO control device. The most practical and economical of these systems would be a vessel with multiple filters, though some vendors recommended against using regenerative thermal oxidizer systems because of this potential problem. Vendors indicated that a recuperative system would

more likely survive an occasional high PM loading but did indicate that such an event would not be desirable and would shorten the lifespan of the control equipment.

While the process requires a BACT determination for every emission unit, this analysis focused on those production scenarios that would have the largest emissions rates since it is less likely that operations with smaller emissions would be cost-effective to control. The operations and their respective estimated annual PM/PM_{10}/$PM_{2.5}$, VOC, and CO emissions are summarized in Table 5-2.

5.6 BACT Process and Foundry Specific Considerations

During preparation and subsequent evaluation of the BACT analysis, a number of considerations and concerns were identified including those discussed below:

5.6.1 RBLC Information Quality

Any critical BACT determining information identified in the RBLC must be verified before use. For example, Indiana Department of Environmental Management was contacted to clarify relatively low VOC emissions limits listed in the RBLC for the PUCB core-making operations identified at two facilities in Indiana. **From these discussions, it was learned the VOC emissions limits are only intended to address binder system catalyst emissions.** VOC emissions from the resin and other potential organic materials used in the process were not addressed in the permit. FWNA has installed similar controls for the VOC emissions from the PUCB catalyst with control efficiency similar to the Indiana permit requirement.

Regarding PM, PM_{10} and $PM_{2.5}$ RBLC determinations, care must be exercised to investigate whether those emission rates include condensable portion and whether a test method that would measure condensable matter (e.g., USEPA Method 202) was specified in the permit.

Finally, it is important to determine whether compliance has been demonstrated with any particular emission limitation. **This concern actually manifested itself in the previous FWNA air permit application where a Waupaca RBLC VOC determination for a shakeout was used. While FWNA was found to not be in compliance with that emission rate, it has been determined that the Waupaca facility cannot meet that emission rate as well.**

5.6.2 RBLC Identified Pollutants and Emission Rates

It is apparent from review of the RBLC, that CO and VOC emissions from pouring, mold cooling, and shakeout operations have been inconsistently identified in air permit applications including several facilities in the RBLC that did not identify any CO or VOC emissions from these operations. This reduces the number of RBLC determinations available for review.

It is important to recognize that a number of the VOC emission limitations identified for the above operations are the emission factor identified in WebFIRE as opposed to the resultant emission rate from a detailed BACT evaluation.

5.6.3 CO and VOC Emission Quantification and Variability

Another important project issue was determining representative VOC and CO emission factors for this analysis. VOC emission factors published in USEPA's AP-42 and WebFIRE for iron foundries are of "poor" or "unknown" quality. In the case of CO, no emission factors exist in AP-

42 or WebFIRE for pouring, mold cooling, and shakeout operations. While FWNA has conducted testing, the dataset is limited.

Following along with the above, it is important to consider material and process variability when comparing CO emission from iron pouring and mold cooling operations. CO emissions may vary due to metal type, pouring temperature, raw materials, throughput rate, and other product or production parameters.

Therefore, it is very difficult to compare CO emissions from individual pouring and mold cooling operations on a pound per hour basis without an understanding of the underlying process. While not perfect, it is prudent to compare operations pouring the same metal (e.g., iron) with similar raw materials (such as mold binder type) in terms of pounds of emission per ton of iron poured. This would at least consider metal type (which gives a good indication of pouring temperature) and production rate.

5.6.4 Commingling of Process Emissions

For successful operation of a fabric filter, emissions from a single foundry operation are usually vented to multiple air pollution control devices. This ensures each fabric filter encounters particles whose size is more widely distributed and that any moist or particles with adhesive properties are not all vented to a single fabric filter The activities of commingling process emissions promote the development of a superior cake and assists with the release of the cake from the filtering media.

Therefore, when reviewing a single foundry RBLC determinations, it must be recognized that the entry is usually not from a single operation but for a commingled exhaust from multiple operations. This commingling not only impact RBLC determinations for particulates but any gaseous pollutant being evaluated.

5.6.5 Air Volume and Capture Rates

Because of the nature of foundry operations, emission unit ventilation requirements due to equipment configuration and access typically require high exhaust airflow rates with a portion of the emission remaining fugitive. The RBLC does not provide an assessment of the capture system or capture rate, which could alter the results of any BACT and the corresponding compliance demonstration.

5.7 Control Technology Feasibility

This section discusses in more detail the “top-down” BACT analysis that will be conducted for each pollutant that exceeded the SER. The five steps in such an evaluation can be summarized as follows:

- **Step 1.** Identify all possible control technologies;
- **Step 2.** Eliminate technically infeasible control options;
- **Step 3.** Rank the technically feasible control technologies based upon emission reduction potential;
- **Step 4.** Evaluate ranked control technologies based on energy, environmental, and/or economic considerations; and
- **Step 5.** Select BACT.

5.7.1 Step 1 – Identify All Control Technologies

The primary objective of Step 1 is to identify all "available" control options for the emission unit in question. Available control options are defined in the 1990 Draft NSR Workshop Manual as:

> … those air pollution control technologies or techniques with a practical potential for application to the emissions unit and the regulated pollutant under evaluation. Air pollution control technologies and techniques include the application of production process or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of the affected pollutant. This includes technologies employed outside of the United States. As discussed later, in some circumstances inherently lower-polluting processes are appropriate for consideration as available control alternatives. The control alternatives should include not only existing controls for the source category in question, but also (through technology transfer) controls applied to similar source categories and gas streams, and innovative control technologies. Technologies required under lowest achievable emission rate (LAER) determinations are available for BACT purposes and must also be included as control alternatives and usually represent the top alternative.

A lower-polluting process or practice is considered applicable if it has been demonstrated for a similar emission unit or application. An add-on control is considered applicable if it can properly function given the physical characteristics of the pollutant stream being controlled (i.e., gas stream temperature, pollutant concentration, etc.).

Potentially applicable control options were surveyed. These included control technologies that have been used in other source categories and countries. Control technologies identified by LAER determinations were also included as available control technologies.

Based on the guidelines provided in the USEPA Draft New Source Review Workshop Manual document, a comprehensive list of available control technologies was developed for this permit application.

5.7.2 Step 2 – Eliminate Technically Infeasible Options

The purpose of Step 2 is to evaluate the technical feasibility of the control technology options identified in Step 1. Control technologies that have been installed and operated successfully on the type of emission unit under review are considered demonstrated and technically feasible. Control technologies that are not applicable or not available are determined to be technically infeasible. For a technology that has not been demonstrated for a particular type of emission unit, the Draft New Source Review Workshop Manual provides the following guidance:

> Two key concepts are important in determining whether an undemonstrated technology is feasible: "availability" and "applicability." As explained in more detail below, a technology is considered "available" if it can be obtained by the applicant through commercial channels or is otherwise available within the common sense meaning of the term. An available technology is "applicable" if it can reasonably be installed and operated on the source type under consideration. A technology that is available and applicable is technically feasible.

A control technique is considered available, within the context presented above, if it has reached the licensing and commercial sales stage of development. A source would not be required to experience extended time delays or resource penalties to allow research to be conducted on a new technique. Neither is it expected that an applicant would be required to experience extended trials to learn how to apply a technology on a new and dissimilar source type.

Consequently, technologies in the pilot scale testing stages of development would not be considered available for BACT review. An exception would be if the technology were proposed and permitted under the qualifications of an innovative control device consistent with the provisions of 40 CFR 52.21(v) or, where appropriate, the applicable SIP.

Commercial availability by itself, however, is not necessarily sufficient basis for concluding a technology to be applicable and therefore technically feasible. Technical feasibility, as determined in Step 2, also means a control option may reasonably be deployed on or "applicable" to the source type under consideration.

Technical judgment on the part of the applicant and the review authority is to be exercised in determining whether a control alternative is applicable to the source type under consideration. In general, a commercially available control option will be presumed applicable if it has been or is soon to be deployed (e.g., is specified in a permit) on the same or a similar source type. Absent a showing of this type, technical feasibility would be based on examination of the physical and chemical characteristics of the pollutant-bearing gas stream and comparison to the gas stream characteristics of the source types to which the technology had been applied previously.

Deployment of the control technology on an existing source with similar gas stream characteristics is generally sufficient basis for concluding technical feasibility barring a demonstration to the contrary.

5.7.3 Step 3 – Rank Remaining Technically Feasible Control Options

The third step in the five step top-down BACT evaluation process involves ranking of the technically feasible control options determined in Step 2 from most effective to least effective in terms of emissions reduction potential. Step 3 also determines the energy, economic, and environmental impacts associated with the technically feasible control options, which are more fully evaluated in Step 4 of the process.

Ranking control options involves the selection of appropriate units of emissions for comparison between types of control technologies and emission units.

Achievable emission limits were determined for each of the control technology options based on engineering estimates, published literature, and testing data from existing sources. After establishing performance levels for the technically feasible control technologies, control technology alternatives were ranked by their demonstrated emissions reduction performance. Also, as indicated in the Draft New Source Review Workshop Manual regarding selection of the defined "top" control technology alternative:

> … an applicant proposing the top control alternative need not provide cost and other detailed information in regard to other control options. In such cases the applicant should document that the control option chosen is, indeed, the top, and review for collateral environmental impacts.

5.7.4 Step 4 – Evaluate Remaining Control Technologies

Step 4 of the five step top-down BACT evaluation process involves evaluating the suitability of the ranked control technology options under Step 3, based on energy, economic, and environmental impacts of use of the control technology. The following excerpt, taken from the Draft New Source Review Workshop Manual, explains the general evaluation process of Step 4:

> "If the applicant accepts the top alternative in the listing as BACT, the applicant proceeds to consider whether impacts of unregulated air pollutants or impacts in other media would justify selection of an alternative control option. If there are no outstanding issues regarding collateral environmental impacts, the analysis is ended, and the results proposed as BACT. In the event that the top candidate is shown to be inappropriate, due to energy, environmental, or economic impacts, the rationale for this finding should be documented for the public record. Then the next most stringent alternative in the listing becomes the new control candidate and is similarly evaluated. This process continues until the technology under consideration cannot be eliminated by any source-specific environmental, energy, or economic impacts which demonstrate that alternative to be inappropriate as BACT."

The energy impacts analysis determines whether the use of the control technology results in any significant or unusual energy penalties or benefits. The economic impacts analysis evaluates average and incremental cost effectiveness to determine if use of the control technology would result in a negative economic impact. The evaluation of environmental impacts considers the site-specific environmental impacts of use of the control technology option, involving issues such as waste generation, water use and discharge, visibility impacts, emissions of additional pollutants, etc.

5.7.5 Step 5 – Selection of BACT

The highest ranked and most effective control option not eliminated in Step 4 for energy, economic, or environmental impacts is selected and proposed as BACT for that pollutant and emission unit.

These procedures were followed to develop a BACT assessment for each major piece of equipment in the process for each of the three PSD triggering pollutants. This analysis is presented in the following sections by pollutant.
Table 5-6, 5-12 and 5-21 provide a summary of the conclusion and basis for each BACT determination.

5.8 Particulate BACT

Almost all of the emission sources in the iron foundry process emit particulate matter in one form or another. The main source of the particulate is the sand used to form the

mold. Particulate is also generated from the finishing and machining of the finished parts and the final coating application.

In the case of the machining, particulate is formed from the fine metal dust during grinding and milling operations. This particulate is generally in filterable form, but a significant amount of condensable particulate can be generated from the pouring, cooling and shakeout operation and is a result of incomplete combustion of the organic compounds emitted from the mold in this step. To much less of a degree condensable particulate is also generated from the combustion of natural gas in the melt shop and the utilities area.

Particulate matter BACT will be reviewed for those emission units where emissions will be increasing with this permit application. From review of Table 1-10, those are emission units ducted to CU01, CU06 (PM2.5 only), and CU08 ($PM_{2.5}$ only) and identified in Tables 2-2 and Table 2-3 and bolded in Table 5-4. Those emission units include:

- Charge Handling (EU01)
- Induction Furnaces #1-#4 (EU07-EU10)
- Hot Metal Transfer (EU13)
- Mold Sand Handling and Preparation (EU22)
- Mold Making #1 (EU33)
- Mold Making #2 (EU34)
- Core Silica Sand Silo A/B (EU35A/EU35B)
- Core Sand Handling and Preparation (EU36)
- Pouring #1/#2 (EU50/EU51)
- Mold Cooling (EU52)
- Shakeout Conveyor (EU53)

Units of combustion are highlighted in Table 5-4 and will be addressed separately in this section.

As stated previously, information from the previous application will be retained as possible and especially for those emission units where emission increases are not requested.

5.8.1 Step 1 – Identify All Control Technologies

Available control technologies with the practical potential for application to the emission unit are identified in Step 1. The application of demonstrated control technologies in other similar source categories to the emission unit of concern can also be considered. While identified technologies may be eliminated in subsequent steps in the analysis based on technical and economic infeasibility or environmental, energy, economic or other impacts, control technologies with potential application to the emission unit under review are identified in this step.

Under Step 1 of the BACT analysis, the following resources are typically consulted when identifying potential control technologies or work practices:

- Applicable NESHAP, NSPS and State Rules
- U.S. EPA's RBLC database;

- Determinations of BACT by regulatory agencies for other similar sources or air permits and permit files from federal or state agencies;
- Federal and/or state regulatory requirements;
- Engineering experience with similar control applications;
- Information provided by air pollution control equipment vendors with significant market share in the industry; and
- Review of literature from industrial technical or trade organizations.

NESHAP Review

As stated in Section 4, FWNA is subject to the Foundry Area Source Rule and is defined by the rule as a "new" source and a "large" foundry. As such, FWNA is subject to the following PM requirements:

- Per 40 CFR §63.10895(c)(2) the facility must not discharge to the atmosphere emissions from any metal melting furnace or group of all metal melting furnaces that exceed 0.1 pounds of PM per ton of metal charged or 0.008 pounds of total metal HAP per ton of metal charged.
- Per 40 CFR §63.10895(e), the facility must not discharge to the atmosphere fugitive emissions from foundry operations that exhibit opacity greater than 20 percent (6-minute average), except for one 6-minute average per hour that does not exceed 30 percent.

RBLC Review

A review of the RBLC was conducted in September 2021. The review assessed permits from the time period of January 2006 through August 2021. Research of the historical and transient databases was not conducted because the control determinations in those databases would precede the implementation of the major and area source National Emission Standards for Hazardous Air Pollutants (NESHAPs) for iron foundries and generally would not be as stringent on emission limits or control technology requirements.

Table 5-5 includes PM/PM_{10}/$PM_{2.5}$ determinations contained in the RBLC. The RBLC identified fabric filters/baghouses as the method of control for filterable particulate matter emissions. No control technology was identified for condensable particulate matter.

RBLC process numbers correspond to the following:

Cupola Furnace	81.410
Induction Furnace	81.420
Desulfurization	81.430
Sand, Core and Mold Making Process	81.440
Casting and Pouring Processes	81.450
Shakeout Processes	81.460
Other Iron Foundry Processes	81.490

For particulate matter from the coating operations, in addition to process number 81.490, the RBLC was reviewed for process number 41.013. This yielded the Fritz Winter North America Facility as the only facility to coat iron castings.

While the RBLC only identified fabric filters/baghouses for the emission units of concern, potential control technologies for filterable particulate matter include the following:

- Cyclones
- Wet scrubber
- Electrostatic precipitators (ESPs)
- Cartridge collectors
- Fabric Filters (Baghouses)

These technologies are discussed below.

Cyclones

A cyclone is a simple mechanical device that uses centrifugal and inertial forces on particulate laden exhaust within cylindrical container. Large particles hit the wall of the cyclone and fall to the bottom where they can be collected. Unless all the particles are of a large diameter (>10 microns) the cyclone is not considered the most efficient collection devices. Cyclones are typically used as a pre-cleaning control used to reduce the particulate concentration in a gas stream prior to entering a second more effective control device.

Wet scrubber

Wet scrubbers used for particulate are generally Venturi scrubbers. In Venturi scrubber particles are removed through inertial impaction when they impact upon water droplets traveling at a high velocity through the throat of the scrubber. Wet scrubbers are useful in removing particulates that are sticky and/or hygroscopic, combustive, corrosive and explosive, hard to remove in dry form, in presence of soluble gases, and have a high moisture content. Venturi scrubbers and spray tower wet scrubbers are types of wet scrubbers generally employed in combustion of solid fuels.

Electrostatic Precipitators (ESPs)

Electrostatic precipitators utilize electrical forces to transfer particulate onto a collector plate. By passing flue gases laden with particulate through a gaseous ion region, known as a corona, particles are given a charge. The charged particles are forced onto the collector plate by an electrical field generated by electrodes kept at high voltage. In dry ESPs, the collected particles are knocked off into a hopper by a sonic horn or mechanically, in a manner that does not introduce them back into the gas stream. Wet ESPs remove PM buildup with intermittent or continuous washing with water.

Cartridge Collectors

Cartridge collector filters utilize paper or nonwoven fibrous media set in an inner and outer wire frame structure. The filter is often pleated to increase surface area. The exhaust is passed through the filter and as particulate is collected on its surface, efficiency increases.

Fabric Filters (Baghouses)

A fabric filter is one of the most efficient means of separating particles from a gas stream. The advantage of fabric filters is that the efficiency is largely insensitive to the physical characteristics of the gas stream and changes in the dust loading. Fabric filters are the industry standard for iron foundry particulate controls.

One type of fabric filter is the baghouse with both positive and negative pressure baghouses being used in the industry. Positive pressure baghouses operate at an internal pressure greater than atmospheric. In this configuration, the exhaust fans are located before the baghouse (i.e., on the "dirty side") and pull the air from the process, then push the air through the baghouse. These systems may vent to ambient air through a continuous ridge vent instead of a stack.

Negative pressure baghouses operate at an internal pressure less than atmospheric. In this configuration, the exhaust fans are located after the baghouse (i.e., on the "clean side"), pull the air from the process through the baghouse, and exhaust to the ambient air through a central stack.

5.8.2 Step 2: – Eliminate Technically Infeasible Options

Below presents a discussion regarding the elimination of certain identified control technologies.

Cyclones

As mentioned earlier, cyclones are typically used as a pre-cleaning control and thus would have to be placed prior to the baghouse. As a pre-cleaner, cyclones are designed to remove more than 80% of particles greater than twenty microns in diameter. The majority of the particulate in the various foundry exhaust streams will be smaller than twenty microns and thus will not be an effective pre-control. Cyclones are a technically infeasible option and will not be analyzed further.

Wet Scrubbers

Wet scrubbers are technically feasible but have many disadvantages compared to fabric filters, which can achieve better levels of particulate control. Scrubber systems have very high pressure drops that result in unacceptable system operating costs. They also required water treatment and sludge disposal, which are not necessary with the other particulate control options.

Wet scrubbers were more commonly used in iron foundries to control exhaust from a cupola furnace. In that application a wet scrubber makes sense because in a cupola fuel is being burned in the furnace where the metal is melted. Typically, the fuel used is coal and since considerable amount of sulfur dioxide is released from such furnaces, the scrubber can remove that as well as particulate. Since FWNA will use an induction furnace that has negligible gaseous emissions and since sand and dust recovery is an essential part of the FWNA process, wet scrubbers are considered not technically feasible to the FWNA process and will not be further analyzed.

ESPs

ESPs are not technically feasible for the FWNA operation. A key parameter is the composition of the particles to be collected. Iron compounds adhere very strongly to the collection plate of the ESP (due to their electromagnetic properties). They are, therefore, very difficult to remove and thus reduce ESP efficiency. Zinc and other metal compounds tend to foul ESP electrodes, also reducing effectiveness. In addition, ESPs have a relatively high capital cost and are greatly affected by sensitivity to the variations in flow rate, solids loading, and temperature fluctuations inherent in batch operations like that seen in an iron foundry. For these reasons ESPs are considered technically infeasible and not considered further.

Cartridge Collectors

Cartridge collectors function optimally with a low loading of dry, non-sticky dust flowing at a low rate of 10,000 cubic feet per minute (cfm) or less and in low humidity. However, for the FWNA process typical air flow rates are in the range of approximately 100,000 dry standard cubic feet per minute (dsfcm). In addition, some of the sand and dust that would be collected on the cartridge may have residual resin material from the core bonding materials that would tend to obstruct the cartridge making it unusable. Due to these limitations, cartridge collectors are only viewed as technically feasible for the machining operations.

Fabric Filters (Baghouses)
Fabric filters and generally baghouses are the industry standard for iron foundries particulate controls and is considered further in the next step.

5.8.3 Step 3: – Ranking Remaining Control Technologies by Control Effectiveness

Now that the control technology has been selected the emission limit needs to be assessed based on this technology.

Using the current state of the art bags and overall design, most vendors will guarantee an outlet grain loading of 0.005 grains per dscf (gr/dscf) for filterable particulate emissions. EPA in developing the emission standards for new "area sources" of HAPs as discussed above established emission levels from melting operations of 0.1 lb/ton of metal. This level of control can only be met with certain baghouse designs.

5.8.4 Step 4: Evaluate Most Effective Controls and Document Results

Table 5-5 provides the PM, PM_{10} and $PM_{2.5}$ RBLC entries for all foundry operations from January 2006 through August 2021 and are sorted by process number.

Prior to 2016, typically the permitted level for all of the operations has been 0.005 gr/dscf. One foundry, Rochester Metal Products, Inc. was permitted at a lower level of 0.003 gr/dscf. We contacted the state agency (IDEM) and they confirmed Rochester Metal Products, Inc. was achieving those levels but for filterable PM only.

ASAMA foundry in Wheland, Georgia has a baghouse with an identified outlet loading of 0.001 gr/dscf. This baghouse only controls emissions from minor sources such as silo bin vents. At this same foundry the permit levels for the main source of emissions is 0.005 gr/dscf and for one application, the shot blasting area is 0.008 gr/dscf.

Following 2016, there are newer installations with outlet loading limitations in the range of 0.001 to 0.003 gr/dscf, depending on expected contribution of condensable particulates. Baghouses with higher inlet loading from melting, pouring, cooling and shakeout have RBLC determinations on the higher side of this range. Operations with no expected condensable fraction (e.g., grinding, shotblasting) have RBLC determinations on the lower side of the range.

5.8.5 Step 5: Select BACT

BACT cannot be less stringent than the applicable NSPS, NESHAP or SIP limit. Since the FWNA foundry will be a minor source of HAPs the applicable NESHAP standard is Subpart ZZZZZ. This

subpart limits the filterable particulate emissions from the melt shop baghouse to 0.1 lb/ton of metal.

Table 5-6 provides the BACT limit and justification for each emission unit.

5.9 CO BACT

In addition to the CO emission from the combustion of fuels (natural gas throughout a number of operations and diesel fuel used at the emergency generators), the main sources of CO from the FWNA are the melting, pouring, cooling and shakeout (PCS) operations.

At the PCS operations CO is generated during partial oxidation of the gases that leave the mold during the pouring operation. These gases contain various organic compounds created from the breakdown of binders in the core and the carbon in the green sand mold. This CO is first emitted at the pouring operation but continues during cooling and shakeout.

The majority of the CO emissions are released via the Core/Mold Baghouse stack (CU08/ST09) as a result of pouring and cooling. CO emissions area also generated during melting and released via the Melt Baghouse stack (CU01/ST02) and during shakeout with those being emitted via the Sand Plant Baghouse (CU06/ST07) stack.

As discussed in Section 1 and identified in Table 1-11, this revision to the previous permit application does not seek to change the previous CO BACT determination for pouring, cooling and/or shakeout, but will address the requested increase in emissions of CO from the electric induction furnaces being emitted from the Melt Baghouse (CU01) stack, ST02. This application seeks to establish a CO emission rate of CO 22.1 tpy from the furnaces that are emitted via ST02 (9.25 tpy is already established in the permit for the fuel combustion sources, therefore the total requested CO emission rate is 31.85 tpy from CU01/ST02).

This BACT analysis leaves the original text that examines potential add-on controls to reduce the CO that is generated from pouring, cooling and shakeout but adds an analysis to determine BACT from the electric induction furnaces.

5.9.1 Step 1 – Identify All Control Technologies

Available control technologies with the practical potential for application to the emission unit are identified in Step 1. The application of demonstrated control technologies in other similar source categories to the emission unit of concern can also be considered. While identified technologies may be eliminated in subsequent steps in the analysis based on technical and economic infeasibility or environmental, energy, economic or other impacts, control technologies with potential application to the emission unit under review are identified in this step.

Under Step 1 of the BACT analysis, the following resources are typically consulted when identifying potential control technologies or work practices:

- Applicable NESHAP, NSPS and State Rules
- U.S. EPA's RBLC database;

- Determinations of BACT by regulatory agencies for other similar sources or air permits and permit files from federal or state agencies;
- Federal and/or state regulatory requirements;
- Engineering experience with similar control applications;
- Information provided by air pollution control equipment vendors with significant market share in the industry; and
- Review of literature from industrial technical or trade organizations.

NESHAP Review

As stated in Section 4, FWNA is subject to the Foundry Area Source Rule and is defined by the rule as a "new" source and a "large" foundry. As such, FWNA is subject to the following PM requirements:

- Per 40 CFR §63.10895(c)(2) the facility must not discharge to the atmosphere emissions from any metal melting furnace or group of all metal melting furnaces that exceed 0.1 pounds of PM per ton of metal charged or 0.008 pounds of total metal HAP per ton of metal charged.
- Per 40 CFR §63.10895(e), the facility must not discharge to the atmosphere fugitive emissions from foundry operations that exhibit opacity greater than 20 percent (6-minute average), except for one 6-minute average per hour that does not exceed 30 percent.

RBLC Review

A review of the RBLC was conducted in September 2021. The review assessed permits from the time period of January 2006 through August 2021. Research of the historical and transient databases was not conducted because the control determinations in those databases would precede the implementation of the major and area source National Emission Standards for Hazardous Air Pollutants (NESHAPs) for iron foundries and generally would not be as stringent on emission limits or control technology requirements.

Table 5-8 includes CO determinations contained in the RBLC. The RBLC identified "mold vent off gas ignition" as the method of control for carbon monoxide emissions.

The data in Table 5-8 is sorted by process number. RBLC process numbers correspond to the following:

Cupola Furnace	81.410
Induction Furnace	81.420
Desulfurization	81.430
Sand, Core and Mold Making Process	81.440
Casting and Pouring Processes	81.450
Shakeout Processes	81.460
Other Iron Foundry Processes	81.490

Potential control technologies include the following:

1. Incineration
2. Flare
3. Mold vent gas autoignition

Incineration

Incineration equipment increases the temperature of exhaust gas stream to the combustion temperature of CO. There are three types of incineration systems: recuperative, regenerative, and catalytic. In a recuperative thermal oxidizer, the exhaust enters a combustion chamber and into a heat exchanger. The heat exchanger utilizes conduction to transfer heat to the waste gas. The exhaust gas can be used to preheat incoming waste gas and/or combustion air to offer fuel savings. A regenerative thermal oxidizer (RTO) uses a direct contact heat exchanger to raise the exhaust temperature.

The heat exchanger is made up of a structured, high heat capacity media like a bed of porous ceramic packing. A regenerative catalytic oxidizer (RCO) is very similar to an RTO but uses a precious metal-based catalyst bed and the oxygen in the gas stream to reduce CO emissions to carbon dioxide (CO2). The catalyst speeds up the conversion of CO at a lower temperature than a thermal incinerator.

Flare

Flares utilizes the fuel value of the exhaust streams themselves and if present in high enough concentrations (CO or VOC), the gas can be burned at the flare tip with some type of ignition source typically at a well elevated level. The gas is burned without heat recovery and directly vented into the atmosphere.

Mold Vent Off Gas Autoignition

When the molten iron is poured onto the sand molds, organic HAP and CO are emitted when the chemicals in the mold and core vaporize or undergo pyrolysis. Emission of HAPs and CO continue to be emitted during cooling and shakeout process. These gases are concentrated into one or two vents built into the mold for the sole purpose of venting the gases generated when molten metal is poured into it. Ignition of the mold off gas vents for the most part occurs almost immediately after pouring begins due to the heat by the molten metal.

5.9.2 Step 2: Eliminate Technically Infeasible Options

Below presents a discussion regarding the elimination of certain identified control technologies.

Incineration

In the FWNA process, an add-on incinerator could only follow a baghouse due to high particulate content in the exhaust streams. Regenerative and catalytic systems can be rendered inoperable if the particulate residuals in the exhaust stream foul the catalyst bed or ceramic media packing of the RTO. Even so placing an RCO downstream of a baghouse still may not protect the unit. Catalyst vendors state that certain compounds might poison a catalyst by reacting with the active sites on the catalyst to render it inactive. Typical elements that need to be considered are sulfur, phosphorus, silicon and heavy metals. The latter two pollutants will be present in the exhaust. Vendors warn that even small concentrations of these elements can render a catalyst ineffective. The gas stream must be carefully characterized to make sure that poisons do not exist.

In particular vendors caution that particulate matter can mask or even poison a catalyst to render it ineffective. However, the size and physical state of the particles must be carefully

considered; particles in the gas stream do not necessarily mean that RCO cannot be used. For example, coarse particles will be caught in the media bed and will not reach the catalyst layer on top. Likewise, condensable particles will re-volatilize by the time they reach the catalyst. Neither case would prevent catalyst operation.

However, fine particulate might reach and deposit on the catalyst layer. Such fine particulate will be present in these exhaust streams.

Flare

As indicated, flares utilize continuous and highly concentrated CO and VOC streams. This would be technically infeasible for the PCS stream because it exhibits a low concentration of CO (<130 ppm) and a low VOC concentration. Utilizing a flare to control CO emissions is not technically feasible and will not be further analyzed.

Mold Vent Off Gas Autoignition

The MACT rule states that mold vent autoignition is occurring if a flame ignites more than 75% of the time during the pouring operation. It is FWNA's experience that this occurs more than 75% of the time in their process but to enhance the probability of auto ignition, gas burner(s) will be situated along the conveyor downstream of the pouring station that will be oriented to ignite the vents on the mold assemblies in case they are not already burning.

5.9.3 Step 3: Ranking Remaining Control Technologies by Control Effectiveness

Mold vent off gas autoignition and incineration are the only technically feasible methods for CO control of PCS emissions. There is a major concern about operation of an RCO due to the possibility that the particulate and metals in the gas stream, in particular the silica particles will poison the catalyst. Regardless an RCO is further evaluated for its cost effectiveness.

5.9.4 Step 4: Evaluate Most Effective Controls and Document Results

As stated above, this application only requests an increase in CO emissions from the Melt Baghouse (CU01) and associated stack (ST02). The below only deviates from the previous test in the Electric Induction Furnace section and to move the previous tables into an Appendices.

Electric Induction Furnaces

To evaluate the economic feasibility of installing an RCO or RTO downstream of the Melt Baghouse (CU01/ST02), the EPA cost estimating spreadsheets for an RCO and RTO were used to estimate the annualized costs. These cost spreadsheets estimate the equipment and operating costs for an oxidizer based on the exhaust flow rate from the processes and installing the necessary duct work to route the gases from the baghouse to the RCO/RTO.

Table 5-9 provides a summary of the cost effectiveness in controlling the CO emissions in this manner. Between the two different oxidizers the cost to control emissions from the Melt Baghouse (CU01/ST02) is estimated to be in the range of $75,000 to $150,000 per ton of pollutant controlled. As VOC could also be controlled by these technologies the cost effectiveness of controlling both emissions were evaluated and determined to be in the range of $65,000 to $130,000 per ton of pollutant controlled. Support for this evaluation is included in Appendix E.

Pouring, Cooling and Shakeout
To evaluate the economic feasibility of installing an RCO or RTO downstream of the Sand Plant Baghouse (CU06/ST07) and Core/Mold Baghouse (CU08/ST09) that control particulate emissions from pouring, cooling and shakeout, the EPA cost estimating spreadsheets for an RCO and RTO were used to estimate the annualized cost. These cost spreadsheets estimate the equipment and operating costs for an oxidizer based on the exhaust flow rate from the processes and installing the necessary duct work to route the gases from each baghouse to the RCO/RTO.

Table 5-10 and Table 5-11 provides a summary of the cost effectiveness in controlling the CO emissions in this manner.

Between the two different oxidizers the cost to control emissions from the Sand Plant Baghouse (CU06/ST07) is estimated to be in the range of $35,000 to $70,000 per ton of pollutant controlled. As VOC could also be controlled by these technologies the cost effectiveness of controlling both emissions were evaluated and determined to be in the range of $22,000 to $46,000 per ton of pollutant controlled. Support for this evaluation is included in Appendix F.

Between the two different oxidizers the cost to control emissions from the Core/Mold Baghouse (CU08/ST09) is estimated to be in the range of $8,000 to $17,000 per ton of pollutant controlled. As VOC could also be controlled by these technologies the cost effectiveness of controlling both emissions were evaluated and determined to be in the range of $7,000 to $15,000 per ton of pollutant controlled. Support for this evaluation is included in Appendix G.

5.9.5 Step 5: Select BACT

Table 5-8 lists the CO emission limits and controls that are currently in place for PCS operations in similar iron foundries which were taken from US EPA RACT/BACT/LAER Clearinghouse (RBLC) database as well as from a search of facility permits of other iron foundries producing similar products that the FWNA foundry will. Emission limits for CO from these operations tend to be consistent and range from 6 lb/ton to 10 lb/ton of molten metal poured. In most cases the shakeout emissions are separated out from the pouring and cooling emissions in order to properly recover the sand. That is why the listing may show 1 lb/ton for shake out and 5 lb/ton for pouring and cooling, but the sum total of the PCS emissions is 6 lb/ton.

Table 5-10 provides the BACT limit and justification for each emission unit.

5.10 VOC BACT

As discussed in Section 1 and identified in Table 1-11, this permit application includes an increase in VOC emissions of thirty-eight tpy over the previous permit application. As shown in Table 1-11 this increase is mainly attributed to the VOCs generated from the mixing of the two-part phenolic urethane resin with the sand prior to core-making as well as use of the core release agent. These emissions would be generated from the Acid Scrubber and associated stack (CU08/ST09).

The increase in VOC emission is also attributed to the Sand Plant Baghouse (CU06/ST07) due to an increase in VOC from Shakeout (EU53). The previous BACT determination was based on an entry from Waupaca Foundry of 0.1 lb/ton. Waupaca Foundry has not been able to comply with this emission rate.

As stated in Section 1, because of the production variables, it is technically more prudent to view PCS emissions in total rather than to attempt to identify CO emissions from pouring, cooling and shakeout discretely. The previous application identified VOC emissions of 44.28 tpy compared to this application that has a small increase to 47.89 tpy.

To a lesser extent, an increase in VOC emissions above the previous application is identified for the Melt Baghouse (CU01) stack, ST01. Initially only VOCs from combustion were estimated. Performance testing indicates approximately four tons per year are being emitted from the melting operation.

In addition to the above and VOC emissions from the combustion of natural gas and diesel fuel from three emergency generators (EU72-EU74), VOC emissions occur from the following operations:

- In addition to shakeout, VOC emissions are released from the pouring and cooling due to the same reason that CO emissions exist, that is due to incomplete combustion of gases emitted from the mold during pouring, cooling and shakeout process. These emissions are released via the Sand Plant Baghouse (CU06/ST07) and the Core/Mold Baghouse (CU08/ST09).
- VOC emission also occur at the finishing operation where the final parts are coated with zinc containing paint. This paint contains some VOC which is emitted from Paint Line #1 Booth Filter (CU17/ST16), Paint Line #2 Booth Filter (CU15/ST15B), and Paint Line #3 Booth Filter (CU14/ST15A).
- As stated above, there is also VOCs emitted from the core shop where the phenolic urethane resin is mixed with the sand and unreacted amine gas is exhausted through the sulfuric acid scrubber (CU07/ST08).
- Minor amounts of VOC emissions from the Core Wash Stations #1, #2, #3 and #4 (EU43, EU79-EU81) amount to approximately 0.444 tpy.
- Limited emissions of VOC occur related to the Rust Prohibitive Application (EU82) is the range of approximately 0.003 tpy.

The sources of VOC emissions in this application are identified in Table 5-13.

5.10.1 Foundry Operations

The following section assesses BACT for the typical foundry operations.

5.10.1.1 Step 1 – Identify All Control Technologies – Foundry Operations

Available control technologies with the practical potential for application to the emission unit are identified in Step 1. The application of demonstrated control technologies in other similar source categories to the emission unit of concern can also be considered. While identified technologies may be eliminated in subsequent steps in the analysis based on technical and economic infeasibility or environmental, energy, economic or other impacts, control technologies with potential application to the emission unit under review are identified in this step.

Under Step 1 of the BACT analysis, the following resources are typically consulted when identifying potential control technologies or work practices:

- Applicable NESHAP, NSPS and State Rules

- U.S. EPA's RBLC database;
- Determinations of BACT by regulatory agencies for other similar sources or air permits and permit files from federal or state agencies;
- Federal and/or state regulatory requirements;
- Engineering experience with similar control applications;
- Information provided by air pollution control equipment vendors with significant market share in the industry; and
- Review of literature from industrial technical or trade organizations.

NESHAP Review

As stated in Section 4, FWNA is subject to the Foundry Area Source Rule and is defined by the rule as a "new" source and a "large" foundry. As such, FWNA is subject to the no organic HAP/VOC requirements associated with the Foundry Area Source Rule other than the metallic scrap management program. Per 40 CFR §63.10885(a) the facility must operate by purchasing only metallic scrap that does not include "post-consumer automotive body scrap, postconsumer engine blocks, post-consumer oil filters, oily turnings, lead components, chlorinated plastics, or free liquids."

As an alternative to the above, the facility can operate according to written material specifications for the purchase and use of only iron and steel scrap that has been depleted (to the extent practicable) of organics and HAP metals in the charge materials used by the iron and steel foundry.

RBLC Review

A review of the RBLC was conducted in September 2021. The review assessed permits from the time period of January 2006 through August 2021. Table 5-14 includes VOC determinations contained in the RBLC.

The RBLC database included entries for melting, pouring, cooling, shakeout, coremaking and miscellaneous operations. Findings of the RBLC included the following:

- For electric induction melting operations, no add on controls were found.
- For pouring/mold cooling operations, no add on control devices were identified. Mold vent ignition was the only work practice standard identified.
- For shakeout operations, no add-on control devices were found. As discussed elsewhere in this document, compliance has not been demonstrated for RBLC entries with emission limits of 0.1 lb/ton.
- For PUCB core machines, acid scrubber for the control of catalyst emissions was identified in the RBLC along with an amine control efficiency of 88.9%.

Other VOC control devices are discussed below.

Other Air Pollution Control Alternatives

Control devices reduce VOC emissions by either recovering or destroying VOCs before they are discharged into the ambient air. Incineration, flares, and mold vent off gas ignition are all viable control technologies to reduce VOC emissions; however, they

have been deemed technologically infeasible for the sand plant. The following additional methods can help to reduce VOC:

- Absorption
- Adsorption
- Condensation
- Incineration
- Biodegradation
- Good work practices

Absorption

Process gases are dissolved in a non-volatile liquid usually by contact in a scrubber which ensures a high surface area of contact between the gas and absorbing liquid (water or some other absorptive liquid in which the gases are soluble).

Adsorption

In adsorption, exhaust gases are routed across a matrix of adsorption solid media such as carbon. The carbon beds can be regenerated and the VOC-laden stream from regeneration reused, disposed of as waste, or incinerated.

Condensation

The exhaust gases are routed across a heat exchanger to drop the temperature of the gases to a value where it will condense out the VOC for collection and reuse or disposal.

Incineration

Incineration equipment increases the temperature of exhaust gas stream to the combustion temperature of VOC. There are three types of incineration systems: recuperative, regenerative, or catalytic. In a recuperative thermal oxidizer, the exhaust enters a combustion chamber and into a heat exchanger. The heat exchanger utilizes conduction to transfer heat to the waste gas through conduction. The exhaust gas can be used to preheat incoming waste gas and/or combustion air to offer fuel savings. A regenerative thermal oxidizer uses a direct contact heat exchanger to raise the exhaust temperature. The heat exchanger is made up of a structured, high heat capacity media like a bed of porous ceramic packing. A catalytic oxidizer uses a precious metal-based catalyst bed and the oxygen in the gas stream to reduce combust the VOC emissions to CO2. The catalyst allows the combustion to occur at a lower temperature than it otherwise would have in a thermal incinerator.

Biofiltration

In biofiltration, exhaust gases are passed over a filter composed of biologically active material to destroy VOCs.

Good Work Practices

As identified in the RBLC the auto-ignition of mold vent gases is one work practice to reduce VOC emissions as well as the metallic scrap management requirements identified above.

5.10.1.2 Step 2: Eliminate Technically Infeasible Options

The following evaluates the technical feasibility of control emissions from foundry operations using the technologies identified above.

Absorption

Because of the complexity of the organic exhaust stream this option was determined to be infeasible for pouring, cooling and shakeout. An acid scrubber will be assumed for use as a means of reducing the amine gas catalyst from the phenolic urethane coremaking operation

Adsorption

Adsorption columns were determined to be technically infeasible methods of control as they typically operate at pollutant loading concentrations of 500 to 2000 ppm and flow rates on the magnitude of 5000 cfm. The high flow rates and low concentrations of this scenario would not allow the VOCs to be effectively adsorbed.

Condensers

Refrigerated condensers were also reviewed as a possible control technology for this scenario. There is no record of a system of this type ever being used in a foundry. Condensers require much greater pollutant loading concentrations than will occur at any typical foundry operations. Concentrations as high as 500 ppm will have removal efficiencies of less than 50%. Per these restrictions, a condenser would not be technically feasible.

Incineration

In the FWNA process, an add-on incinerator could only follow a baghouse due to high particulate content in the exhaust streams. Regenerative and catalytic systems can be rendered inoperable if the particulate residuals in the exhaust stream foul the catalyst bed of ceramic media packing of the RTO.

Even so placing an RCO downstream of a baghouse still may not protect the unit. Catalyst vendors state that certain compounds might poison a catalyst by reacting with the active sites on the catalyst to render it inactive. Typical elements that need to be considered are sulfur, phosphorus, silicon and heavy metals. The latter two pollutants will be present in the exhaust. Vendors warn that even small concentrations of these elements can render a catalyst ineffective. The gas stream must be carefully characterized to make sure that poisons do not exist.

In particular vendors caution that particulate matter can mask or even poison a catalyst to render it ineffective. However, the size and physical state of the particles must be carefully considered; particles in the gas stream do not necessarily mean that RCO cannot be used. For example, coarse particles will be caught in the media bed and will not reach the catalyst layer on top. Likewise, condensable particles will re-volatilize by the time they reach the catalyst. Neither case would prevent catalyst operation.

However, fine particulate might reach and deposit on the catalyst layer. Such fine particulate will be present in the exhaust of these two streams.

Recuperative thermal oxidizers were reviewed to determine the technical feasibility of this control technology. The typical air flow rate for this type of control technology is from 500 to 50,000 standard cubic feet per minute (scfm). The air flow rates are well above the maximum of the typical range. The pollutant loading (concentration) for this technology should be approximately 1500 to 3000 ppmv to maintain appropriate temperatures required. This installation is well below these concentrations regardless of the emissions unit described. Due to these considerations described in USEPA's Air Pollution Control Technology Fact Sheet, recuperative thermal oxidizers were considered infeasible.

Flare

As indicated, flares utilize continuous and highly concentrated CO and VOC streams. This would be technically infeasible because of the low concentrations of CO and VOC in each exhaust.

Mold Vent Off Gas Autoignition

The MACT rule states that mold vent autoignition is occurring if a flame ignites more than 75% of the time during the pouring operation. It is FWNA's experience that this occurs more than 75% of the time in their process but to enhance the probability of auto ignition, gas burner(s) will be situated along the conveyor downstream of the pouring station that will be oriented to ignite the vents on the mold assemblies in case they are not already burning. capture rate, which could alter the results of any BACT and the corresponding compliance demonstration.

5.10.1.3 Step 3: Ranking Remaining Control Technologies by Control Effectiveness

For melting, pouring, cooling and shakeout, provided the air volumes and concentrations, incineration would be the only control technology that would likely be feasible.

Regarding coremaking, the cores are produced in an enclosed automated press machine. The machine takes the properly weighed out core sand and mixes it with the appropriate amount of a two-part phenolic urethane resin and hardener. The care making process is referred to as the cold box method which involves passing the sand/binder core through an amine (typically dimethyl propylamine) gas which is a catalyst that quickly hardens the resin. The resins have a very low vapor pressure and the emissions from the core machine are primarily unreacted amine. The industry standard control device for this operation is a sulfuric acid scrubber, specifically designed to reduce the amine gas concentration for odor concerns.

5.10.1.4 Step 4: Evaluate Most Effective Controls and Document Results

This assessment is identical for one made for CO in the sections above with the only difference being the emission levels of VOC are a fraction of what it was for CO. Tables 5-15 through 5-17 proved the cost effectiveness. In all cases, neither the RTO or RCO control technology is cost effective. Due to the high particulate loading in the exhaust

of these streams the other potential control technologies other than incineration are not technically feasible.

Electric Induction Furnaces

To evaluate the economic feasibility of installing an RCO or RTO downstream of the Melt Baghouse (CU01/ST02), the EPA cost estimating spreadsheets for an RCO and RTO were used to estimate the annualized costs. These cost spreadsheets estimate the equipment and operating costs for an oxidizer based on the exhaust flow rate from the processes and installing the necessary duct work to route the gases from the baghouse to the RCO/RTO.

Table 5-15 provides a summary of the cost effectiveness in controlling the VOC emissions in this manner. Between the two different oxidizers the cost to control emissions from the Melt Baghouse (CU01/ST02) is estimated to be in the range of $443,000 to $870,000 per ton of pollutant controlled. As VOC could also be controlled by these technologies the cost effectiveness of controlling both emissions were evaluated and determined to be in the range of $65,000 to $130,000 per ton of pollutant controlled. Support for this evaluation is included in Appendix H.

Pouring, Cooling and Shakeout

To evaluate the economic feasibility of installing an RCO or RTO downstream of the Sand Plant Baghouse (CU06/ST07) and Core/Mold Baghouse (CU08/ST09) that control particulate emissions from pouring, cooling and shakeout, the EPA cost estimating spreadsheets for an RCO and RTO were used to estimate the annualized cost. These cost spreadsheets estimate the equipment and operating costs for an oxidizer based on the exhaust flow rate from the processes and installing the necessary duct work to route the gases from each baghouse to the RCO/RTO.

Table 5-16 and Table 5-17 provides a summary of the cost effectiveness in controlling the CO emissions in this manner.

Between the two different oxidizers the cost to control emissions from the Sand Plant Baghouse (CU06/ST07) is estimated to be in the range of $65,00 to $135,000 per ton of pollutant controlled. As VOC could also be controlled by these technologies the cost effectiveness of controlling both emissions were evaluated and determined to be in the range of $22,000 to $46,000 per ton of pollutant controlled. Support for this evaluation is included in Appendix I.

Between the two different oxidizers the cost to control emissions from the Core/Mold Baghouse (CU08/ST09) is estimated to be in the range of $65,000 to $135,000 per ton of pollutant controlled. As VOC could also be controlled by these technologies the cost effectiveness of controlling both emissions were evaluated and determined to be in the range of $7,000 to $15,000 per ton of pollutant controlled. Support for this evaluation is included in Appendix J.

Coremaking

To evaluate the economic feasibility of installing an RCO, regenerative thermal oxidizer or recuperative thermal oxidizer in place of or downstream of the Acid Scrubber

(CU07/ST08), the EPA cost estimating spreadsheets were used to estimate the annualized costs. These cost spreadsheets estimate the equipment and operating costs for an oxidizer based on the exhaust flow rate from the processes and installing the necessary duct work to route the gases to the oxidizer.

Table 5-18 provides a summary of the cost effectiveness in controlling the VOC emissions in this manner. Between the three different oxidizers the cost to control emissions in place of or downstream of the Acid Scrubber (CU07/ST08) is estimated to be in the range of $10,000 to $26,000 per ton of pollutant controlled. Support for this evaluation is included in Appendix K.

5.10.1.5 Step 5: Selection of BACT

Table 5-14 provides BACT and permit listings for VOC from PCS operations at iron foundries similar to the FWNA foundry. The lowest emission levels in the listing are 0.5 lb/ton for pouring and cooling operations and 0.1 lb/ton for shakeout operations which is what is being proposed as the BACT level for PCS emissions. For all three operations FWNA proposes a work practice for VOC BACT. FWNA proposes a work practice for control of VOC from the PCS process by practicing and ensuring mold vent autoignition.

A work practice for the core shop is to ensure the pH of the sulfuric acid scrubber is maintained below a pH of 4.5 to ensure that amine is absorbed. As well as keep any unused resin containers closed.

5.10.2 Coating Operations

FWNA has determined it will not install a fourth paint line. This results in a reduction in potential VOC and xylene emissions from 26 to 21.7 tpy and 5.4 to 1.9 tpy, respectively. Please refer to Appendix C for the emission calculations and Appendix D for the Safety Data Sheets (SDSs). As a result of the elimination of the fourth paint line with this application FWNA requests Alternative Operating Scenario #1 be identified within the Air Permit as the representative operating scenario.

Following the submission of the original air permit application and subsequent to the initial air permit application revision, FWNA and their contractors addressed a number of concerns regarding the appropriate BACT for the control of VOC emissions from the coating operations. This application incorporates that work.

5.10.2.1 Step 1 – Identify All Control Technologies

The finished product is coated with zinc particles applied in a spray coating operation using zinc containing paints. The potential VOC emissions from the three paint lines (EU68, EU69 and EU71) is 21.7 tpy.

Available control technologies with the practical potential for application to the emission unit are identified in Step 1. The application of demonstrated control technologies in other similar source categories to the emission unit of concern can also be considered. While identified technologies may be eliminated in subsequent steps in

the analysis based on technical and economic infeasibility or environmental, energy, economic or other impacts, control technologies with potential application to the emission unit under review are identified in this step.

Under Step 1 of the BACT analysis, the following resources are typically consulted when identifying potential control technologies or work practices:

- Applicable NESHAP, NSPS and State Rules
- U.S. EPA's RBLC database;
- Determinations of BACT by regulatory agencies for other similar sources or air permits and permit files from federal or state agencies;
- Federal and/or state regulatory requirements;
- Engineering experience with similar control applications;
- Information provided by air pollution control equipment vendors with significant market share in the industry; and
- Review of literature from industrial technical or trade organizations.

NESHAP Review
As stated in Section 4, FWNA is an "area source" of hazardous air pollutants (HAPs) subject to the Foundry Area Source Rule as well as possible application of the Surface Coating Area Source Rule. Neither rule identify any rule applicability to FWNA operations.

RBLC Review
A review of the RBLC was conducted in September 2021. The review assessed permits from the time period of January 2006 through August 2021. The only VOC determination for the coating of iron castings contained in the RBLC was for the operation of FWNA.

Other VOC control devices are discussed below.

Other Air Pollution Control Alternatives
Control devices reduce VOC emissions by either recovering or destroying VOCs before they are discharged into the ambient air. Incineration, flares, and mold vent off gas ignition are all viable control technologies to reduce VOC emissions; however, they have been deemed technologically infeasible for the sand plant. The following additional methods can help to reduce VOC:

- Absorption
- Adsorption
- Condensation
- Incineration
- Biofiltration
- Good work practices

Absorption
Process gases are dissolved in a non-volatile liquid usually by contact in a scrubber which ensures a high surface area of contact between the gas and absorbing liquid (water or some other absorptive liquid in which the gases are soluble).

Adsorption
In adsorption, exhaust gases are routed across a matrix of adsorption solid media such as carbon. The carbon beds can be regenerated and the VOC-laden stream from regeneration reused, disposed of as waste, or incinerated.

Condensation
The exhaust gases are routed across a heat exchanger to drop the temperature of the gases to a value where it will condense out the VOC for collection and reuse or disposal.

Incineration
Incineration equipment increases the temperature of exhaust gas stream to the combustion temperature of VOC. There are three types of incineration systems: recuperative, regenerative, or catalytic. In a recuperative thermal oxidizer, the exhaust enters a combustion chamber and into a heat exchanger. The heat exchanger utilizes conduction to transfer heat to the waste gas through conduction. The exhaust gas can be used to preheat incoming waste gas and/or combustion air to offer fuel savings. A regenerative thermal oxidizer uses a direct contact heat exchanger to raise the exhaust temperature. The heat exchanger is made up of a structured, high heat capacity media like a bed of porous ceramic packing. A catalytic oxidizer uses a precious metal-based catalyst bed and the oxygen in the gas stream to reduce combust the VOC emissions to CO2. The catalyst allows the combustion to occur at a lower temperature than it otherwise would have in a thermal incinerator.

Biofiltration
In biodegradation, exhaust gases are passed over a filter composed of biologically active material to destroy VOCs.

Good Work Practices
Possible work practices for coating operations includes the use of low VOC coatings and retaining VOC-containing coatings in closed containers when not in use.

5.10.2.2 Step 2: Eliminate Technically Infeasible Options
The following evaluates the technical feasibility of control emissions from foundry operations using the technologies identified above.

Absorption
This control method and associated technologies are considered infeasible because the VOC from the coating operation is not water soluble.

Adsorption

Adsorption is technically feasible for painting operations but typically adsorption is chosen as a viable control technique only when particulate in the exhaust stream being treated is minimal such as printing operations where only volatile vapors exist. Carbon adsorption has been used in the past for painting operations in the automotive industry where exhaust air flows are relatively small, and the VOC content is not large enough to warrant direct oxidation.

Following submittal of the original permit application but prior to the initial permit revision, Fritz Winter has contacted numerous vendors of pollution control devices to obtain quotes for installation of a carbon adsorption/ regeneration system. VOC air pollution control device vendors contacted did not offer onsite regeneration units or stated the relatively small amount of VOC emissions did not warrant a carbon regeneration system especially considering the absence of on-site process reuse or recovery.

Vendors encouraged the consideration of more cost-effective control technologies. The vendors stated that onsite regeneration of activated carbon is viable only when the quantities of VOC are much greater and when the recoverable material is intended for reuse in the process. Regardless, adsorption remains a technically feasible control option for the air permit application.

Condensation

Condensation will not be an effective control method because VOC concentrations from the paint booth would be too dilute to be condensed.

Biofiltration

Like adsorption a biofilter will generate a solid waste requiring disposal and likely not be cost effective when compared to incineration/oxidation. It will be retained as a feasible alternative for evaluation.

Incineration

Incineration remains a technically feasible control option for this operation.

Good Work Practices

In order many operations especially where solvents are used or in coating operations the VOC containing materials can be handled properly to minimize evaporation from storage or if possible, obtain substitute low VOC containing materials.

5.10.2.3 Step 3: Ranking Remaining Control Technologies by Control Effectiveness

The remaining control technologies are ranked in the following order with regard to likely control effectiveness:

1. Incineration/Oxidation
2. Carbon Adsorption
3. Biofiltration
4. Good Work Practices

5.10.2.4 Step 4: Evaluate Most Effective Controls and Document Results

A cost effectiveness evaluation was made for the addition of an RTO, biofilter, and activated carbon adsorber in the previous application. Table 5-19 provides the results of that analysis for Phase 1 (as the fourth paint booth will not be installed). Cost effectiveness range from $23,000 to $48,000 per ton of VOC removed. Appendix L provides the text from the previous application along with the supporting documents.

Evaluation of the traditional EPA BACT cost effectiveness calculation spreadsheet for a carbon adsorption system with actual vendor quotes, indicated that the cost of a carbon adsorption system is higher than the EPA spreadsheet used for the original permit application would indicate. Evaluation of the traditional EPA BACT cost effectiveness calculation spreadsheet for an RTO with actual vendor quotes indicated that the cost of an RTO is lower than the EPA spreadsheets appear to indicate. The lowest cost of the two vendor quotes was then inserted into the cost effectiveness calculations and the new cost-effective results that are summarized in Table 5-19 and supported by Appendix L.

While the FWNA permit was the only application identified in the RBLC, during the 2017 air permit application revision, for BACT comparison purposes Fritz Winter reviewed permits from similar facilities that practiced surface coating of iron cast parts and identified three foundries. Their permits are provided in Appendix M and the limits are summarized in Table 5-20. Neither of the three issued air permits require any kind of VOC treatment of emissions.

5.10.2.5 Step 5: Selection of BACT

The proposed BACT for the coating operation is good work practices by keeping unused paint and solvent containers covered at all times.

5.11 BACT for Utility Operations

Natural gas burners will be utilized in several places around the foundry. At the pouring stations they are used to ensure even heat of the refractory spout during the pouring operation, and at the refractory relining area where new ladles are being fabricated or old ladles are repaired with new refractory lining. New refractory linings must be heat treated and that is done using an open flame natural gas burner. Whenever natural gas is burned in the foundry it will be by open flame which ensures good combustion which minimizes both CO and VOC emissions. Since natural gas is used and not some other fossil fuel the amount of particulate being generated is also minimized.

BACT for natural gas burning is a work practice of burning it in an open flame following vendor recommendations to ensure complete combustion. The amount of particulate, CO and VOC generated from this combustion operation is assumed to be equal to or less than emissions listed in Section 1.4 of AP-42 for natural gas burning in boilers.

The FWNA foundry will have three diesel fired emergency generators to produce power for critical operations in the foundry in case of outage. These generators will meet the emission standards listed in NSPS Subpart IIII which has just been recently updated and is being proposed as BACT for that operation.

BACT for all the VOC emitting sources are summarized in Table 5-21.

Section 6
Air Quality Analysis

The following section provides the Air Quality Analysis (Analysis) used to demonstrate that the facility will not cause or contribute to a violation of either the National Ambient Air Quality Standards (NAAQS) or the Prevention of Significant Deterioration (PSD) Class I or Class II Increment. The Analysis also demonstrates that the FWNA facility will comply with 401 KAR 63:020 that regulates "potential hazardous matter or toxics substances (i.e., toxic air pollutants – TAPs)" and addresses the secondary formation of ozone and PM with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$).

Part C of Title I of the Clean Air Act, 42 U.S.C. §§7470-7492, is the statutory basis for the PSD program. USEPA and Kentucky Division for Air Quality (KDAQ) have codified PSD definitions, applicability, and requirements in 40 CFR Part 52.21 and 401 KAR 51:017, respectively. PSD is the component of the New Source Review (NSR) permitting program that is applicable in areas that are not designated as in nonattainment of the NAAQS. Simpson County, where the FWNA facility is located, is currently designated as "attainment" or "unclassifiable" for all criteria pollutants and must comply with the air permitting requirements associated with the PSD regulations.

As the initial installation and subsequently issued permit estimated emissions above the PSD major source threshold (one hundred tpy) for carbon monoxide (CO) and volatile organic compounds (VOCs), the FWNA facility is a PSD major source. In addition, the facility has significant emission rates (SERs) of particulate matter (PM), PM with an aerodynamic diameter of less than 10 microns (PM_{10}), and PM with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$).

Given the proposed project exceeds the PSD major source threshold for CO/VOC and exceeds the SER for other regulated pollutants with established SILs, NAAQS, and/or PSD Increment standards, an air quality modeling analysis was conducted.

Conducting the Analysis in accordance with the Air Dispersion Modeling Protocol submitted to and approved by Kentucky Division for Air Quality (KDAQ) and USEPA Region 4, the screening analysis indicated that the project would exceed the PSD Significant Impact Levels (SILs) for both PM_{10}, and $PM_{2.5}$, therefore cumulative analysis modeling evaluation was completed for both these pollutants. The results of the cumulative analysis described below demonstrates the project will not cause an exceedance of the National Ambient Air Quality Standards (NAAQS) or exceed PSD increment consumption levels.

6.1 Modeling Methodology

Prior to conducting the Analysis an Air Dispersion Modeling Protocol document was submitted to KDAQ for review and comment. Comments received by KDAQ and USEPA Region 4 precedes the protocol in Appendix N.

The protocol was modified to address the following comments by KDAQ/USEPA:

- The parallel version of AERMOD (AERMOD Breeze) was not utilized so an equivalency demonstration was not necessary.

- The Analysis uses the most recent meteorological data for years 2016-2020 as provided by KDAQ.
- As addressed below and in the appendices, all increment consuming sources provided by KDAQ were evaluated.
- A formal request for pre-construction monitoring waiver was submitted and approved by KDAQ. The request and letter are provided in Appendix O.
- Justification for the use of existing ambient air monitors to provide background concentrations used in the model is provided in the text below.
- An FLM/USFS Request for Determination form was prepared and submitted.
- Air toxics analysis was prepared and completed by modeling the concentrations and comparing those the Region 9, November 2021 Region Screening Level (RSL).
- The NAAQS and PSD Increment modeling inventory was revised to reflect any changes to existing sources or additions to new sources in the area as addressed below and in the appendices.

A brief summary of the protocol is provided in the sections below:

6.1.1 Model Selection

The U.S. EPA American Meteorological Society / Environmental Protection Agency Regulatory Model (AERMOD) model including a state-of-the-science downwash algorithm and utilizes AERMET, a meteorological data preprocessor that utilizes current planetary boundary layer theory to calculate dispersion coefficients. The most current version of the AERMOD model (version 21112) was used in conducting the modeling analysis.

The modeling was performed using the regulatory default option, which includes:

- Stack-tip downwash; and
- A routine for processing averages when calm wind conditions occur or when meteorological data is missing

6.1.2 Meteorological Data

EPA modeling guidance allows the use of five years of off-site meteorological data or at least one year of on-site meteorological data. KDAQ provided meteorological data for the years 2016 through 2020.

6.1.3 Building Downwash

The emission sources considered in this analysis were evaluated in terms of their proximity to nearby structures. The purpose of the evaluation was to determine if stack discharge might become caught in the turbulent wakes of these structures. Wind blowing around a building creates zones of turbulence that are greater than if the building was absent. Plumes entrained in the zones of turbulence experience enhanced plume growth and restricted plume rise. AERMOD incorporates the Plume Rise Model Enhancements (PRIME) algorithms using dimensions from the EPA's Building Profile Input Program (BPIP) for estimating for plumes affected by building wakes. The site layout was be used to digitize buildings and structures to be included in the downwash analysis.

Direction-specific building dimensions and the dominant downwash structure parameters will be determined using the BREEZE® BPIP software. This software incorporates the algorithms of the U.S. EPA-sanctioned Building Profile Input Program with PRIME enhancement (BPIP-PRIME).

6.1.4 Model Terrain

The terrain elevation for each modeled receptor, building, and source will be determined using the USGS National Elevation Dataset (NED).

The terrain height for each modeled receptor will be calculated using the AERMOD terrain processor (AERMAP version 18081). In addition to terrain elevation, an additional parameter called the hill height scale is required for each receptor to execute AERMOD's terrain modeling algorithms. AERMOD computes the impact at a receptor as a weighted interpolation between horizontal and terrain-following states using a critical dividing streamline approach. This scheme assumes that part of the plume mass will have enough energy to ascend and traverse over a terrain feature and the remainder will impinge and traverse around a terrain feature under certain meteorological conditions. The hill height scale will be computed by the AERMAP terrain preprocessor for each receptor as a measure of the one terrain feature in the modeling domain that would have the greatest effect on plume behavior at that receptor.

The hill height scale does not represent the critical dividing streamline height itself but supplies the computational algorithms with an indication of the relative relief within the modeling domain for the determination of the critical dividing streamline height for each hour of meteorological data.

According to Section 2.2.1 of the AERMOD Users Guide, the NED array boundary for AERMAP must include all terrain features that exceed a 10 percent elevation slope from any given receptor to properly calculate the hill height scale at each receptor. The domain for the hill height analysis was set to the minimum coverage required for proper handling of elevation slope (an automated feature within the Breeze AERMOD software).

6.1.5 Urban/Rural Determination

As with the initial construction modeling, the facility remains located in a predominantly rural area. Therefore, rural settings will be selected in AERMOD.

6.1.6 Receptor Grid Coordinate System

The same Cartesian receptor grid spacing [using UTM WGS84 coordinate system] in the i**nitial construction demonstration** will be used for the SMC and SIA model runs including:

- receptors spaced at 100-meter intervals along the fenceline;
- receptors spaced at 100-meter intervals extending approximately 4 km from the center of the facility.
- Receptors spaced at five hundred meter extending from 4 km to 10 km from the center of the facility;
- If necessary, receptors spaced 1,000 meters extruding from 10 km to 50 km from the center of the facility.

The results of the SIA modeling, demonstrating the extents of the Significant Impact Area, determined the size of the Cartesian receptor grid (with 100-meter spacing) surrounding the facility to be used for PSD Increment and NAAQS modeling analyses. Locations of off-site background sources and Class I Area(s) will determine the locations of additional receptors.

6.2 Modeled Emission Sources

The Significance Analysis evaluates the emission increases associated with the specific project and does not take into consideration any regional off-site emissions sources or other facility emission sources.

The NAAQS analysis considers both on-site and off-site sources of the emissions of concern. This section discusses the emission sources considered, emission rates, and modeling methods utilized in the Significance Analysis and NAAQS analysis.

Each emission source at the proposed facility was modeled at its maximum hourly emission rate for all modeled pollutants. The only source of emissions not included in the modeling is that from the emergency generators. EPA recognizes that not all emission sources need to be included in an air quality analysis such as source that may be permitted to operate 500 hr/yr but will likely operate much less than that and in a random fashion such as the FWNA emergency generators.

6.3 Class II Significance Analysis

The Class II Significance Analysis is conducted to determine whether the emissions increases associated with the projects would cause a significant impact upon the area surrounding the facility and is conducted to determine the need for further pollutant modeling. The Significance Analysis included the following pollutants: PM_{10}, $PM_{2.5}$, and CO. Impacts determined to be "significant" are defined by ambient concentration exceeding thresholds referred to as the SILs and shown in Table 6-1.

Modeled emission points, parameters, and emission rates for the Significance Analyses are provided in Table 6-2. Figure 6-1 and 6-2 indicate the location of the buildings, receptors, property line areas.

Figure 6-3 shows the receptor grid for the SIL evaluation at 100-meter spacing from facility center to 4,000 meters in each direction, and 500-meter spacing from 4,000 meters to 10,000 meters in each direction. The results of the Significance Analyses for each pollutant are provided in Table 6-3 and represent the maximum modeled concentrations from the significance runs. All modeled results reported for the Significance Analysis correspond to H1H modeled impacts for the five-year meteorological period evaluated.

Graphical outputs of the SIL concentrations are provided in Figures 6-4 through 6-7. The maximum impact greater than the SIL was determined by the PM2.5 24-hour concentrations and determined to be at a radius of 2,907 m. This radius was used as the significant impact analysis for all NAAQS and PSD increment compliance demonstrations.

The screen modeling results for CO do not exceed the SILs for either the 1-hour or 8-hour averaging periods; therefore, no additional modeling is required for CO. The screen modeling results for PM_{10}, as presented in Table 6-3 exceeds the SIL for the 24-hour averaging periods; therefore, a cumulative analysis modeling is required for PM_{10}. The screen modeling results for $PM_{2.5}$, as presented in Tables 6-3, do exceed the SILs for the 24-hour and annual averaging periods; therefore, cumulative analysis

modeling is required for $PM_{2.5}$. For this modeling the same receptor grid spacing as identified above was used.

6.4 Ambient Monitoring Requirements

The PSD Significance Analysis is also used to determine whether the applicant is exempt from ambient monitoring requirements. To determine whether pre-construction monitoring should be considered, the maximum modeled impacts attributable to the proposed project are assessed against Significant Monitoring Concentrations (SMC). The SMC for the applicable averaging periods for PM_{10}, $PM_{2.5}$, and CO are provided in 40 CFR 52.21(i)(5)(i) and are listed in Table 6-1.

A pre-construction air quality analysis using continuous monitoring data may be required for pollutants subject to PSD review per 40 CFR 52.21(m). If either the predicted modeled impact from an emissions increase or the existing ambient concentration is less than the SMC, an applicant may be exempt from pre-construction ambient monitoring. The SMC value for $PM_{2.5}$ was vacated on January 22, 2013; however, EPA has responded to the vacatur by indicating that existing background monitors should be sufficient to fulfill the ambient monitoring requirements.

As shown in Table 6-4, the CO and PM_{10} SMC was not exceeded, therefore, preconstruction monitoring is not required. The SMC was exceeded for $PM_{2.5}$ and therefore preconstruction monitoring may be required. Below addresses the request that the preconstruction monitoring requirement be met with existing regional monitors.

6.4.1 Pre-Construction Monitoring Waiver Request

By letter dated November 3, ,2021, FWNA was granted a waiver from the 40 CFR 52.21(m) requirement to conduct pre-construction site-specific monitoring of ambient air for the purpose of establishing background concentrations for the permit application required air quality impact analysis. The request and waiver are provided in Appendix O.

6.4.2 Ambient Background Concentrations

As part of the KDAQ response to the waiver request, FWNA was assigned the responsibilities of providing sufficient justification of a representative background monitoring location that fulfills the requirements of 401 KAR 51:017 and 40 CFR Part 51, Appendix W.

The purpose of representative background monitoring concentrations is to account for concentrations that are not attributed to the source or site being evaluated and not explicitly modeled in the air dispersion modeling analysis. The background concentration is to account for other emission sources such as natural sources, nearby sources other than the sources under consideration.

Per Section 8.3 of Appendix W, when determining background concentrations, the following should be considered:

- Background should not include the ambient impact of the project source or other nearby sources that are accounted for in the modeling;

- Ambient concentrations from natural sources in the area are typically accounted for in the background concentration.
- The dataset should be of sufficient completeness and follow appropriate data validation procedures.

The nearest PM_{10} monitor is located at 105 South 17th Street, Nashville, TN (Davidson County) at the Lockeland School (Lockeland Monitor – AQS Site ID 47-037-223). It is classified by USEPA as "Industrial".

The nearest $PM_{2.5}$ monitor is located at 226 Sunset Street, Smiths Grove, Bowling Green, Kentucky (Smiths Grove - AQS Site ID 21-227-0009). This monitor was used in the previous permit applications. The monitoring location is classified by USEPA as being "Residential", but the location is near a heavily populated and traveled area.

Both the Nashville and Bowling Green monitors meet the above requirements and provides a conservative background concentration for the FWNA location as both areas are urban locations.

To develop background concentrations, monitoring values were downloaded from EPA AirData Air Quality Monitors database for each of the two sites. Calendar years 2018-2020 were used for the Smiths Grove Site. Because the data was incomplete for the Lockeland Monitor for 2020, years 2018, 2019 and 2021 were used. As shown in Table 6-5 the resulting background concentration for the 24-hour PM_{10} standard is 35.67 µg/m3 and the background concentrations for the 24-hour and annual $PM_{2.5}$ standards are 16.77 µg/m3 and 7.79 µg/m3, respectively.

6.5 Regional Inventory Data

As identified above the SIL was exceed for the PM_{10} 24-hour standard, $PM_{2.5}$ 24-hour standard and the $PM_{2.5}$ annual standard. As such, it was necessary to develop regional inventory data for Class II modeling for each of these standards. Because of the facilities proximity to Tennessee, in addition to KDAQ, Tennessee Department of Environmental Conservation (TDEC) provided emission inventories of potential sources that can impact the air quality within the impact area. Both inventories together included approximately 11,000 records.

The regional modeling inventory information was compiled by determining all sources from the KDAQ and TDEC inventories located within a 50 km radius of the FWNA facility. As provided for in the air dispersion modeling protocol, EPA's 20D rule was used as a screening technique to allow the elimination of any sources where emissions (in tpy) are less than 20 times the distance from the source. Prior to applying the "20D Rule" various emission sources at a single facility were combined such that they were not eliminated. Appendix P provides the workbooks in electronic format showing the reduction in facilities.

Tables 6-6 and 6-7 provide the remaining sources PM_{10} and $PM_{2.5}$ sources, respectively. f

6.6 Cumulative Modeling Analysis

A Cumulative Analysis modeling was required for PM_{10} and $PM_{2.5}$ based on the screening model results discussed above; therefore, modeling was performed to demonstrate compliance with the NAAQS standards and PSD Increment values identified in Table 6-1.

6.6.1 National Ambient Air Quality Standard Modeling Results

To demonstrate compliance with the $PM_{2.5}$ annual standard, each year of meteorological data was modeled and the highest value from each of the five models was compared to the annual standard. To demonstrate compliance with the $PM_{2.5}$ and PM_{10} 24-hour standards the models were run with all five years of meteorological data. The NAAQS modeling includes all proposed emission sources at their maximum hourly emission rates identified in Table 6-2, as well as the off-site sources listed in Table 6-6 and 6-7. The refined PM_{10} and $PM_{2.5}$ modeling (NAAQS and PSD Increment) included only those receptors that were within the largest calculated SIA for the respective averaging time (as determined above the SIA is a radius of 2,907 m from the facility center.

Similar to the previous application, receptors on the property of Hanson Aggregate Franklin Quarry fenceline were removed from the refined modeling receptor set. Figure 6-8 identifies the receptor locations for the refined modeling at 100-meter spacing from the facility center to 3,000 meters in each direction. Source included in the modeling were the FWNA sources along with the applicable off-site sources.

Table 6-8 presents the summary of results for PM_{10} 24-hour and PM2.5 Annual model runs and demonstrates compliance with their respective standards.

6.6.2 PSD PM_{10} and $PM_{2.5}$ Increment Modeling Results

In addition to NAAQS modeling, the modeling also must demonstrate compliance with the PSD increment. The PSD increment, which can only be assessed through modeling, is the means by which the PSD rules prevent air quality from being deteriorate any more than that threshold.

The analysis starts with a baseline date and any emission sources added after that baseline date are included in the increment model runs. For major sources of PM_{10} the baseline date started in 1987 for $PM_{2.5}$ it was 2010. For minor sources the baseline date is established by the initial complete PSD application submitted in the Baseline Impact Area. This permit application was submitted on July 13, 2016, by FWNA. Therefore the final off-site source list must include any source. installed or modified after that date. Reviewing the sources, no emissions were identified from new or modified sources that should be included in the PSD Increment Modeling.

Table 6-9 compares the highest second high modeling 24-hour result for the each of the five years of meteorological data to the increment limit for PM_{10} and $PM_{2.5}$ while the highest high modeling results for each of the five years of meteorological data is used for the corresponding annual increment.

6.7 Class I Significance Analysis

Class I areas are federally protected areas for which more stringent air quality standards apply to protect unique natural, cultural, recreational, and/or historic values. The current Federal Land Manager (FLM) policies, as outlined in the FLAG document (2010 Federal Land Air Guidance) state that any Class I areas within 300 km of the proposed source as well as any other Class I areas that may be potentially affected should be identified and evaluated for potential air quality impacts on those Class I areas.

Table 6-10 lists these Class I areas, their location coordinates, their distance from the proposed site. each location. Figure 6-9 shows the Class I area locations in relation to the site. The below sections evaluate the potential impacts to those Class 1 area locations.

6.7.1 Class I Area Screening (Q/D) Analysis

There are five Class I areas within 300 km of the proposed FWNA foundry, the closest area is Mammoth Cave located approximately 51 km northeast of the proposed site.

To demonstrate the project will have no significant impacts on Class I air quality relative value (AQRV) including visibility the Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report provides a Q/D screening criteria if the Class I Area is more than 50 km away. The Q/D screening criteria indicates that if the total sulfur dioxide (SO_2), nitrogen oxides (NO_x), PM_{10}, and sulfuric acid mist (H_2SO) annual emissions (in tons per year, based on 24-hour maximum allowable emissions), divided by the distance (in km) from the Class 1 area is less than 10, then the project is assumed to have no impact on AQRVs.

As shown in Table 3-2, the total annual visibility affecting emissions from the FWNA facility is 52.99 tpy (33.91 tpy PM_{10} + 1.04 SO_2 + 18.04 tpy NO_x). As the nearest Class I area is fifty-one kilometers away, the resulting Q/D is 1.04 which is well below the threshold of 10.

6.7.2 Class I Increment Evaluation

To evaluate the maximum potential impact of the FWNA facility on the Class I areas, AERMOD was used to determine concentrations at the boundary of the model to show the concentrations are decreasing as the emissions approach the nearest Class I location and that the maximum concentration was only a small portion of the Class I increment.

To accomplish this, receptors were placed at distances of 48 km, 49km and 50 km radius at +/- 5° from the centerline from the facility to each Class I area with 100 m spacing between receptors. For graphical purposes an additional radial receptor grid was established at 10°around the facility with receptors from 0 to 50 km with 1 km spacing. See Figure 10 for an illustration. To conduct the analysis the CY2020 meteorological data was used as that year produced both the highest annual and 24-hour $PM_{2.5}$ concentrations.

Figures 6-10 and 6-11 show a graphical representation of the 24-hour and annual concentrations decreasing in all directions with maximum modeled $PM_{2.5}$ 24-hour average concentration (H2H) of 0.10812 $\mu g/m^3$ at any one of the 48km, 49km or 50 km distances from the facility versus a PSD Class I increment of 2 $\mu g/m^3$. Similarly the $PM_{2.5}$ annual average concentration (H1H) maximum concentration of 0.00617 $\mu g/m^3$ compared to an increment of 1 $\mu g/m^3$. These results are summarized in Table 6-11.

6.8 Tier 1 Analysis – Consideration of Modeled Emission Rates for Precursors (MERPs)

KDAQ released a document entitled "Application of the . 's Modeled Emission Rates for Precursors (MERPS) for Secondary Pollutant Formation in Kentucky." Following release of this document, on April 30, 2019, USEPA issued an update to their guidance entitled "Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program."

When modeled design concentrations are less than the applicable SIL, further analyses (NAAQS and PSD Increment) are not required for that pollutant-averaging period. If modeled impacts are greater than the SIL, a full NAAQS and PSD Increment analysis is required for that pollutant and averaging period to demonstrate that the facility neither causes nor contributes to any exceedances.

EPA recently issued guidance specifying a SIL value for ozone of 1 ppb and has developed a new demonstration methodology (the MERPs guidance) to provide a framework for a Tier 1 demonstration that can illustrate that a project will not cause or contribute to any violation of ambient ozone standards. The February 2019 Georgia EPD guidance document titled Guidance on the Use of EPA's MERPs to Account for Secondary Formation of Ozone and $PM_{2.5}$ in Georgia, which is based on the EPA MERPS guidance, was used to provide a Tier 1 demonstration that ozone impacts from the projects will not cause or contribute to ambient air quality levels of ozone. Both VOC and NOX emissions increases from the projects were considered. Details regarding that analysis can be found in Section 4.5.6 of this report.

In accordance with the revised and updated 40 CFR 51, Appendix W, precursor emission impacts to ozone and $PM_{2.5}$ (secondary $PM_{2.5}$) must be considered as part of the modeling analysis. The precursors to ground-level ozone formation are VOC and NOX, and the precursor emissions for secondary $PM_{2.5}$ formation are NO_X and SO_2.

In accordance with the revised and updated 40 CFR 51, Appendix W, precursor emission impacts to ozone and $PM_{2.5}$ (secondary $PM_{2.5}$) must be considered as part of the modeling analysis. The precursors to ground-level ozone formation are VOC and NOX, and the precursor emissions for secondary $PM_{2.5}$ formation are NO_X and SO_2.

Elevated ground-level ozone concentrations are the result of photochemical reactions among various chemical species. These reactions are more likely to occur under certain ambient conditions (e.g., high ground-level temperatures, light winds, and sunny conditions). The chemical species that contribute to ozone formation, referred to as ozone precursors, include NO_X and VOC emissions from both anthropogenic (e.g., mobile and stationary sources) and natural sources (e.g., vegetation). Pursuant to 40 CFR 52.21, ambient ozone monitoring is not required unless a project's emissions increase is greater than one hundred tpy of VOC or NOX.

6.8.1 $PM_{2.5}$ MERPs Assessment

As Outlined in Table 3 of the KDAQ 2018 guidance, the default MERP values (tpy) for KDAQ applications are 2,499 tpy NOx and 1,500 tpy SO2 for daily PM2.5 and 8,333 tpy NOx and 10,000 tpy SO2 for annual PM2.5.

The KDAQ 2018 guidance provides the following equation for determining if a cumulative analysis is necessary when the project emissions exceed the PM2.5 significant emission rate (SER) of ten tpy:

$$\frac{Max\ PM2.5\ ModeledConcentration}{PM2.5\ SIL} + \frac{SO2\ Emission\ Rate}{SO2\ MERP} + \frac{NOx\ Emission\ Rate}{NOx\ MERP} < 1$$

24-hour $PM_{2.5}$ Discrete Analysis:

Substituting the values for the 24-hour PM2.5 standard:

$$\frac{8.44059}{1.2} + \frac{1.04}{1{,}500} + \frac{18.04}{2{,}499} > 1$$

$$7.03 + 0.001 + 0.007 > 1$$

$$7.03 > 1$$

Annual $PM_{2.5}$ Discrete Analysis:

Substituting the values for the 24-hour PM2.5 standard:

$$\frac{1.59}{0.2} + \frac{1.04}{10{,}000} + \frac{18.04}{8{,}333} > 1$$

$$7.95 + 0.0001 + 0.002 > 1$$

$$7.95 > 1$$

Because both the 24-hour and Annual PM2.5 discrete analysis resulted in values greater than 1 a cumulative analysis must be conducted. Permit the guidance the PM2.5 cumulative analysis uses the following equation:

$$PM2.5\ BG + PM2.5\ DV + \left(\frac{SO2\ Emission\ Rate}{SO2\ MERP} + \frac{NOx\ Emission\ Rate}{NOx\ MERP}\right) * PM2.5\ SIL$$

$$\leq PM2.5\ NAAQS$$

24-hour $PM_{2.5}$ Cumulative Analysis:

$$16.77 + 7.39 + \left(\frac{1.04}{1{,}500} + \frac{18.04}{2{,}499}\right) * 1.2 \leq 35$$

$$16.77 + 7.39 + (0.001 + 0.007) * 1.2 \leq 35$$

$$16.77 + 7.39 + (0.001 + 0.007) * 1.2 \leq 35$$

$$24.10 \leq 35$$

Annual $PM_{2.5}$ Cumulative Analysis:

$$7.79 + 1.65 + \left(\frac{1.04}{10{,}000} + \frac{18.04}{8{,}333}\right) * 1.2 \leq 12$$

$$7.79 + 1.65 + (0.0001 + 0.002) * 1.2 \leq 12$$

$$9.44 \leq 12$$

6.8.2 Ozone MERPs Assessment

As Outlined in Table 3 of the KDAQ 2018 guidance, the default MERP values (tpy) for KDAQ applications are 169 tpy NOx and 3,333 tpy VOC for the 8-hour ozone standard.

For the SIL Analysis the guidance indicates the following equation should be used for the initial analysis and nothing further is required if this standard is met:

$$\frac{NOx\ Emission\ Rate}{NOx\ MERP} + \frac{VOC\ Emission\ Rate}{VOC\ MERP} < 1$$

Solving for the above equation provides the following:

$$\frac{18.04}{169} + \frac{112.45}{3{,}333} < 1$$

$$0.107 + 0.034 < 1$$

$$0.141 < 1$$

As the predicted ozone value is less than the threshold value of 1, the predicted impact of the projects is less than the ozone SIL (1 ppb). Therefore, there are no adverse impacts associated with precursor emissions for ozone as part of these projects, and a cumulative ozone analysis is not required.

6.9 Toxics Modeling

The project includes emissions of certain compounds that have a Regional Screening Level (RSL) value identified in EPA Region IX RSL tables. To demonstrate FWNA will comply with 401 KAR 63:020 that regulates potential hazardous matter or toxics substances (i.e., toxic air pollutants – TAPs) and in order to evaluate whether these toxic compounds are in sufficient concentration that they could present a health hazard, air dispersion modeling is conducted per KDAQ's request.

The same meteorological data and stack conditions described elsewhere are used to determine maximum annual ground level concentrations of each TAP. The maximum concentration of the receptors of concern are compared to the concentrations listed as having a significant health threat in EPA Region IX "Regional Screening Level (RSL) Resident Ambient Air Table (TR=1E-6, HQ=1) November 2021".

Similar to the initial application Figure 6-12 provides an area map and on this map, we located model receptors at location where individuals may be present for an extended period (residences, work areas etc.). This sensitive receptor set was then input to the model and using the same meteorological data and stack conditions described in this section, AERMOD was used to calculate the maximum annual ground level concentrations of each of the toxic compounds at each receptor.

The maximum concentration of all the receptors was compared to the RSL. Table 6-12 provides the results of this modeling that demonstrates that the maximum concentration found in our modeling are below the RSL listed values.

Section 7
Other Impact Analysis

PSD regulations require that additional impacts be considered as part of a PSD permit action. These include a growth analysis and a soil and vegetation analysis. The effect of the proposed project's emissions on local soils and vegetation is addressed through comparison of modeled impacts to secondary NAAQS and other relevant screening criteria that have been developed by the U.S. EPA to provide protection for public welfare, including protection against decreased visibility, damage to animals, crops, vegetation and buildings.

An economic growth analysis is intended to assess the amount of new growth that is likely to occur in support of the new project and to estimate emissions resulting from associated growth. Associated growth relates to any residential and commercial/industrial growth that may result from the construction of the proposed project. Residential growth depends on the number of new employees and the availability of housing in the area, while associated commercial and industrial growth consists of new sources providing services to the new employees and the facility.

This AIA assesses the environmental impact on soils, vegetation, and when necessary, the visibility caused by the increase in emissions following the projects and any associated impact resulting from associated industrial, commercial and residential growth. A separate task to assess the ambient air quality following the changes is completed and resulted in the demonstration that compliance with the National Ambient Air Quality Standards (NAAQS) and PSD Increments is provided in Section 6 of this document.

7.1 Ambient Air Quality Analysis

The ambient air quality analysis projects the air quality that will exist in the area of the proposed source during construction and after the plant begins operation.

As part of the PSD permit application, air dispersion modeling is conducted to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS) and PSD Increments for significant pollutants of concern. The modeling included the foundry and machining emissions, nearby emission sources that could potentially impact the proposed location, and background concentrations to predict the resultant maximum ambient air quality impacts around the constructed facility. The results of the air dispersion modeling showed compliance with all applicable standards and/or requirements.

7.2 Class I Visibility

Visibility can be affected by plume impairment or regional haze. Plume impairment results when there is a contrast or color difference between the plume and a viewed background (the sky or a terrain feature). Plume impairment is generally only of concern when the Class I area is near the proposed source (i.e., less than 50 km). As the Mammoth Cave National Park is just over 50 km, the possibility of plume impairment will be assumed.

To address the above, the EPA New Source Review Workshop Manual recommends that a visibility analysis be conducted. There are three levels for the visibility analysis: Level 1, Level 2 and Level 3. A

Level 1 analysis is the most conservative and if the visibility screening criteria is not exceeded no further analysis is required.

VISCREEN was used to assess possible impacts on visibility due to the proposed project. VISCREEN is an EPA-approved model that assesses the visibility of plumes of emission sources from a vantage within the nearest Class I area. VISCREEN uses a very conservative approach to assess visibility impacts as it uses the "worse-case" meteorological values for wind speed and stability class.

VISCREEN requires inputs of emissions of particulate matter and nitrogen oxides (primary NO_2, primary SO_4 and soot are also considered if present). Table 3-2 annual PM and NOx emissions rates of 33.91 tpy and 18.04 tpy, respectively were used are shown in Table 7-1. Detailed emission calculations for total PM and NO_x can be found in tables in Appendix C.

The nearest Class I area is Mammoth Caves National Park located north-northeast from FWNA with a nearest boundary of 51 km and the farthest boundary of the wilderness area is estimated at 62 km. The observer distance was chosen at the nearest Class I area boundary.

The VISCREEN Summary Report is provided in Appendix Q and includes the distance and the observer angles, theta, azi, and alpha, present conservative line of sight values that maximize the light-scattering properties of the emissions from the proposed source. Results are given in the "Plume" columns of both the Delta-E and Contrast parameters. The criteria are also provided for comparison. The Delta-E is the color difference parameter that specifies the perceived changes of color and brightness. This is the primary basis for determining the perceptibility of plume visual impacts. The criteria used by VISCREEN for Delta-E is 2.0. The threshold value of perceptibility has been traditionally 1.0 for Delta-E and 0.02 for contrast. The Contrast column is the green contrast (0.55 km) which has a criteria value of 0.05.

As seen in the Summary Report all the modeled values for Delta-E and Contrast were well below the criteria values. Further analysis was not necessary as the Level 1 analysis indicates that none of the screening criteria were exceeded.

7.3 Secondary Impacts on Soil and Vegetation

No impacts are expected on soils or vegetation in either Simpson or the surrounding counties. Ambient concentrations of air pollutants that typically impact vegetation such as ozone, NO_x, and SO_2 are not significantly increased by the proposed project. The primary pollutant from the facility is carbon monoxide. NO_x and SO_2 emission increase were small enough that federal regulations do not require an ambient impact analysis. A qualitative assessment of the ozone impacts due to the direct emissions of VOC and NO_x was completed and has determined that it is very unlikely that secondary formation of ozone from VOC or NOx emissions, attributable to the project, will have a significant impact on the ozone levels in the area.

Conversion of nitrogen oxides (NO_x) and VOC emissions to tropospheric ozone is not instantaneous, but occurs over time, with the rate of conversion dependent upon weather conditions. The rate of ozone production can be limited by either VOCs or NO_2. In general, ozone formation using these two precursors is reliant upon the relative sources of hydroxide (OH) and NO_x. In urban areas with a high population concentration, ozone is often VOC-limited. Ozone is generally NO_x-limited in rural areas and downwind suburban areas" (EPA-452/R-08-003 March 2008). Further, ozone formation is recognized as a regional and long-range transport issue. Therefore, it is very unlikely that secondary formation of

ozone from VOC emissions attributable to the project will have a significant impact on the ozone levels in the area.

Particulate matter emissions from melting, pouring, cooling, shotblast, and grinding consist largely of oxides of iron. Particulate emissions from the mold and core production and shakeout consist mostly of sand, clay, and iron oxides. None of the particulate emissions are expected to have adverse impacts on soils or vegetation. Sand, clay, and iron oxides are common in the local soils. Particulate emissions from the foundry will not be acidic or caustic and are not expected to have any effects on soil, vegetation, or crops.

CO has not been found to produce detrimental effects on plants at concentrations below 100 ppm for exposures of one to three weeks. Since the ambient standards have been established at 35 ppm (40 mg/m^3) and 9 ppm (10 mg/m^3) for the 1-hour and 8-hour averages, respectively, there is no threat to plant life from CO emissions at the site.

7.4 Wildlife Impacts

Impacts to wildlife can occur due to direct uptake of pollutants through ingestion or via the skin and more indirectly as a result of air pollution induced changes to wildlife habitat and food source. Impacts of air pollution induced injury and death in wildlife has been focused on pollutants other than CO. It is likely any toxicity most severely in circumstances where air pollutants were likely elevated far above the ambient air quality standards (AAQS), or where significantly elevated concentrations of pollutants occurred on vegetation that is subsequently consumed.

A review of available information indicates there have been no observed adverse impacts to wildlife in the area due to the 1985 and 1992 projects. No pollutants were elevated above the AAQS nor were there elevated concentrations of pollutants that would have affected consumable vegetation.

7.5 Growth Analysis

The elements of the growth analysis include a projection of associated industrial, commercial, and residential growth that will occur in the area due to the proposed project and an estimate of the air emissions generated by such growth.

The FWNA foundry at full build-out will employ approximately two hundred and fifty people. This workforce comes from local communities, and because the foundry will be located approximately fifteen miles from Bowling Green, the remaining workforce will come from within that city area. Therefore, growth impacts are minimal and should not adversely affect the ambient air quality in the surrounding area. The site is bordered by two major roadways (I-65 and State Highway 31), so additional roadways are not planned.

No significant related increases in the residential, commercial, or industrial growth are anticipated in the area because of the construction and operation of the foundry and machining operations.

As no associated industrial or commercial growth is anticipated, no increase in “secondary emissions” or emissions from other facilities in the area are expected from the proposed construction of the new foundry.

7.6 Construction Impacts

The construction of the facility has already occurred. Please review the prior permit application packages if this subject is of interest.

Appendix A
Tables

Table 1-1. Phase 1 - PM, PM_{10} and $PM_{2.5}$ Emission Limitations

Control Device (Stack)	Emission Units Controlled	Type of Control and Pollutants Controlled	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02)	EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16, EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0010 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0010 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0006 gr/dscf 0.85 lb/hr 3.72 ton/yr

Table 1-2. PM, PM_{10} and $PM_{2.5}$ Emission Limitations

Control Device (Stack)	Emission Units Controlled	Type of Control and Pollutants Controlled	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02)	EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0006 gr/dscf 0.850 lb/hr 3.72 ton/yr
CU06 (ST07)	EU22, EU23, EU24, EU26, EU27, EU28, EU29, EU30, EU31, EU32, EU53, EU54, EU55, EU56	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0015 gr/dscf 1.30 lb/hr 5.67 ton/yr
CU08 (ST09)	EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0015 gr/dscf 2.12 lb/hr 9.30 ton/yr
CU11 (ST12)	EU60, EU61, EU62, EU64, EU65	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0015 gr/dscf 0.792 lb/hr 3.47 ton/yr

Table 1-3. VOC and CO Emission Limitations

Stack or Vent	Emission Units Combined	BACT for VOC	BACT for CO
CU01 ST02	EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16	0.14 lb/hr; 0.61 ton/yr	2.11 lb/hr; 9.25 ton/yr
CU07 ST08	EU39, EU40, EU41, EU42	0.70 lb/hr; 1.67 ton/yr	N/A
CU08 ST09	EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59	20.8 lb/hr; 39.7 ton/yr	128 lb/hr; 235 ton/yr

Table 1-4. Shakeout Conveyor (EU53) - VOC and CO Emission Limitations

Emission Unit	Emission Unit Description	BACT for VOC	BACT for CO
EU53	Shakeout Conveyor	0.10 lb/ton gray iron; 4.58 ton/yr	1.00 lb/ton gray iron; 25.3 lb/hr

Table 1-5. CU01/ST02 - November and December 2018 Test Results

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/hr)	CO (lb/hr)
Emission Limit	0.0010	0.0010	0.0006	0.14	2.11
Performance Test Result	0.00063	0.0017	0.0017	0.28	26.37

Table 1-6. CU06/ST07 and EU53 - November and December 2018 Test Results

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/ton gray iron)	CO (lb/ton gray iron) (lb/hr)
Emission Limit	0.0025	0.0025	0.0015	0.1	1 25.3
Performance Test Result	0.00042	0.0120	0.012	0.2	0.3 5.13

Table 1-7. CU01/ST02 - March 2020 Test Results

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/hr)	CO (lb/hr)
Emission Limit	0.0010	0.0010	0.0006	0.14	2.11
Performance Test Result	0.00042	0.0007	0.0007	1.42	7.77

Table 1-8. CU06/ST07 and EU53 - March 2020 Test Results

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/ton gray iron)	CO (lb/ton gray iron) (lb/hr)
Emission Limit	0.0025	0.0025	0.0015	0.1	1 25.3
Performance Test Result	0.00091	0.0018	0.0018	0.11	0.086 1.24

Table 1-9. Comparison of 2017 to 2021 Emissions Increase

Pollutant	PSD SER (tpy)	2017 Permit Modification		2021 Permit Revision	
		Emissions Increase (tpy)	PSD Permitting Required? (Yes/No)	Emissions Increase (tpy)	PSD Permitting Required? (Yes/No)
Filterable PM	25	43.3	Yes	33.91	Yes
PM_{10}	15	47.3	Yes	33.91	Yes
$PM_{2.5}$	10	30.9	Yes	33.91	Yes
SO_2	40	1.49	No	1.04	No
NO_x	40	28.5	No	18.04	No
VOC	40	79.1	No	112.45	Yes
CO	100	297	Yes	312.39	Yes
Lead	0.6	0.28	No	0.02	No
		527.87		545.67	

Table 1-10. Comparison of Current to Proposed PM BACT

Control Device (Stack)	CURRENT PERMIT (2017)			PROPOSED LIMITS (2021)		
	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02)	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0006 gr/dscf 0.850 lb/hr 3.72 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr
CU06 (ST07)	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0015 gr/dscf 1.30 lb/hr 5.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr
CU08 (ST09)	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0015 gr/dscf 2.12 lb/hr 9.30 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr
CU11 (ST12)	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0015 gr/dscf 0.792 lb/hr 3.47 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr
			Increase over Current Permit (2017) in tpy:	**-4.86**	**-4.86**	**9.92**

Table 1-11. Comparison of Current to Proposed VOC and CO BACT

Stack or Vent	CURRENT PERMIT (2017)		PROPOSED LIMITS (2021)	
	BACT for VOC	**BACT for CO**	**BACT for VOC**	**BACT for CO**
CU01 ST02	0.14 lb/hr; 0.61 ton/yr	2.11 lb/hr; 9.25 ton/yr	3.85 lb/hr; 4.85 ton/yr	22.04 lb/hr; 31.85 ton/yr
CU06 ST07 (Previously EU53)	0.10 lb/ton gray iron; 4.58 ton/yr	1.00 lb/ton gray iron; 25.3 lb/hr	0.528 lb/ton gray iron; 13.39 lb/hr 24.18 ton/yr	1.00 lb/ton gray iron; 25.30 lb/hr 45.79 ton/yr
CU07 ST08	0.70 lb/hr; 1.67 ton/yr	N/A	18.22 lb/hr; 33.31 ton/yr	N/A
CU08 ST09	20.8 lb/hr; 39.7 ton/yr	128 lb/hr; 235 ton/yr	33.26 lb/hr; 27.38 ton/yr	127.82 lb/hr; 234.74 ton/yr
	Increase over Current Permit (2017) in tpy:		**43.16**	**22.34**

Table 2-1. Emission Unit Descriptions and Changes identifed in 2021 Air Permit Application

Emission Unit	Description	Requested Description Change	FWNA Comments
EU01	Scrap Steel Storage	Combine into single emission unit as identified as Charge Handling (EU01)	
EU02	Alloy Storage		
~~EU03~~	~~Scrap Drying~~	~~No Change~~	This unit will not be installed
~~EU04~~	~~Scrap Cleaning~~	~~No Change~~	This unit will not be installed
EU05	Refractory Burner #1	No Change	
EU06	Refractory Burner #2	No Change	
EU07	Induction Furnace #1	No Change	
EU08	Induction Furnace #2	No Change	
EU09	Induction Furnace #3	No Change	
EU10	Induction Furnace #4	No Change	
~~EU11~~	~~Holding Furnace #1~~	~~No Change~~	This unit will not be installed
~~EU12~~	~~Holding Furnace #2~~	~~No Change~~	This unit will not be installed
EU13	Transport Ladle #1	Combine into a single emission unit identified as Hot Metal Transfer (EU13)	
EU14	Transport Ladle #2		
EU15	Pouring Furnace #1	No Change	This will be installed when demand volume dictates
EU16	Pouring Furnace #2	No Change	
EU17	Melt Baghouse Waste Dust Silo	No Change	
EU18	Refractory Curing Mobile Burner	No Change	
EU19	Mold Silica Sand Silo	No Change	
EU20	Blend Silo	No Change	
EU21	Bentonite Silo	No Change	
EU22	Mold Silica Sand Bin	Combine into a single emission unit identified as Mold Sand Handling and Preparation (EU22)	
EU23	Blend Bin		
EU24	Bentonite Bin		
EU26	Mold Silica Sand Weigh Hopper		
EU27	Blend Weigh Hopper		
EU28	Bentonite Weigh Hopper		
EU29	Dust Weigh Hopper		
EU30	Green Sand Mixer #1		
EU31	Green Sand Mixer #2		
EU32	Green Sand Mixer #3		
EU33	Mold Stamping #1	Mold Making #1	
EU34	Mold Stamping #2	Mold Making #2	This will be installed when demand volume dictates
EU35A	Core Silica Sand Silo A	No Change	
EU35B	Core Silica Sand Silo B	No Change	
EU36	Sand Classifier	Combine into a single emission unit identified as Core Sand Handling and Preparation (EU36)	
EU37	Core Silica Sand Bin		
EU38	Core Silica Sand Weigh Hopper		
EU39	Core Machine #1	PUCB Core Machine #1	
EU40	Core Machine #2	PUCB Core Machine #2	
EU41	Core Machine #3	PUCB Core Machine #3	This will be installed when demand volume dictates
EU42	Core Machine #4	PUCB Core Machine #4	This will be installed when demand volume dictates

EU43	Core Removal	Core Wash Station #1	
EU44	Dryer #1	Core Dryer #1	
EU45	Dryer #2	Core Dryer #2	
EU46	Dryer #3	Core Dryer #3	This will be installed when demand volume dictates
EU47	Dryer #4	Core Dryer #4	This will be installed when demand volume dictates
EU48	Mold Assembly #1	Combine into Mold Making #1 (EU33)	
EU49	Mold Assembly #2	Combine into Mold Making #2 (EU34)	This will be installed when demand volume dictates
EU50	Pouring #1	No Change	
EU51	Pouring #2	No Change	This will be installed when demand volume dictates
EU52	Cooling Tunnel	Mold Cooling	
EU53	Shakeout Conveyor	No Change	
EU54	Sand Cooler	Combine into a single emission unit identified as Mold Sand Handling and Preparation (EU22)	
EU55	Used Mold & Core Sand Storage	Combine into a single emission unit identified as Mold Sand Handling and Preparation (EU22)	
EU56	Sand Screening	Combine into a single emission unit identified as Mold Sand Handling and Preparation (EU22)	
EU57	Sand Plant Waste Sand Silo	No Change	
~~EU58~~	~~Mold Shop Baghouse Waste Dust Silo~~	~~No Change~~	This unit will not be installed
EU59	Forced Air Cooler	Casting Cooling	
EU60	Sorting	Sorting Conveyor	
EU61	Steel Shot Blasting #1	No Change	
EU62	Steel Shot Blasting #2	No Change	This will be installed when demand volume dictates
EU63	Fettling Baghouse Waste Dust Silo	No Change	
EU64	Grinding #1	Auto Grinding #1	
EU65	Grinding #2	Auto Grinding #2	
EU66	Turning Lathes (8)	Machining Lines (9)	
EU67	Drilling & Milling (2)	Perforation Line (1)	
EU68	Paint Booth #1	Paint Line #3	
EU69	Paint Booth #2	Paint Line #2	
~~EU70~~	~~Paint Booth #3~~	~~Paint Line #4~~	This unit will not be installed
EU71	Paint Booth #4	Paint Line #1	
EU72	Emergency Generator #1	No Change	
EU73	Emergency Generator #2	No Change	
EU74	Emergency Generator #3	No Change	
~~EU75~~	~~Gasoline Storage Tank~~	~~No Change~~	This unit will not be installed
EU75	Diesel Storage Tank	No Change	
EU76	Paved Roads	No Change	
EU77	Snag Grinder #1	Addition	Emission unit may not be identified in existing Air Permit.
EU78	Snag Grinder #2	Addition	Emission unit may not be identified in existing Air Permit.
EU79	Core Wash Station #2	Addition	Included in existing air permit as EU43 but broken out as it functions as a discrete emission unit.
EU80	Core Wash Station #3	Addition	Included in existing air permit as EU43 but broken out as it functions as a discrete emission unit. Will be added as
EU81	Core Wash Station #4	Addition	Included in existing air permit as EU43 but broken out as it functions as a discrete emission unit. Will be added as
EU82	Rust Preventative Application	Addition	Emission unit may not be identified in existing Air Permit.

LEGEND

Installed but likely not addressed in existing air permit

Included in existing air permit but emission unit is not installed at this time. Permit, rules and guidance will be consulted to insure air permit provides authorization for installation.

Table 2-2. Control Device, Stack and Emission Unit ID Number Cross Reference

Control Device ID	Stack ID	Control Device and Stack Description	Emission Unit #1	Emission Unit #2	Emission Unit #3	Emission Unit #4	Emission Unit #5	Emission Unit #6	Emission Unit #7	Emission Unit #8	Emission Unit #9	Emission Unit #10	Emission Unit #11	Emission Unit #12	Emission Unit #13	Emission Unit #14	Emission Unit #15	Emission Unit #16	Emission Unit #17	Emission Unit #18	Emission Unit #19
CU01	ST02	Melt Baghouse	EU01	EU02	~~EU03~~	~~EU04~~	EU05	EU06	EU07	EU08	EU09	EU10	~~EU11~~	~~EU12~~	EU13	EU14	EU15	EU16	EU18		
CU02	ST03	Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent	EU17																		
CU03	ST04	Mold Silica Sand Silo Bin Vent Filter	EU19																		
CU04	ST05	Blend Silo Bin Vent Filter	EU20																		
CU05	ST06	Bentonite Silo Bin Vent Filter	EU21																		
CU06	ST07	Sand Plant Baghouse	EU22	EU23	EU24	EU26	EU27	EU28	EU29	EU30	EU31	EU32	EU53	EU54	EU55	EU56					
CU07	ST08	Acid Scrubber	EU39	EU40	EU41	EU42															
CU08	ST09	Core/Mold Baghouse	EU33	EU34	EU36	EU37	EU38	EU43	EU44	EU45	EU46	EU47	EU48	EU49	EU50	EU51	EU52	EU59	EU79	EU80	EU81
~~CU09~~	~~ST10~~	~~Core/Mold Baghouse Waste Dust Silo Bin Vent Filter~~	~~EU58~~																		
CU10	ST11	Sand Plant Baghouse Waste Sand Silo Bin Vent Filter	EU57																		
CU11	ST12	Fettling Baghouse	EU60	EU61	EU62	EU64	EU65														
CU12	ST13	Fettling Baghouse Waste Dust Silo Bin Vent Filter	EU63																		
CU13a-CU13h	ST16	Machining Lines Cartridge Collectors	EU66																		
CU13i-CU13j	ST16	Perforation Line #2 Cartridge Collector	EU67																		
CU14	ST15A	Paint Line #3 Booth Filter	EU68																		
CU15	ST15B	Paint Line #2 Booth Filter	EU69																		
CU16	ST15C	~~Paint Line #4 Booth Filter~~	~~EU70~~																		
CU17	ST16	Paint Line #1 Booth Filter	EU71	EU82																	
CU19	ST09	Core Silica Sand Silo A Bin Vent Filter	EU35A																		
CU20	ST09	Core Silica Sand Silo B Bin Vent Filter	EU35B																		
NA	STG1	Emergency Generator #1	EU72																		
NA	STG2	Emergency Generator #2	EU73																		
NA	STG3	Emergency Generator #3	EU74																		
NA	STTK1	~~Gasoline Storage Tank Vent~~	~~EU75~~																		
NA	STTK1	Diesel Storage Tank Vent	EU75																		
NA	FUG	Paved Roadways	EU76																		
CU21	ST12	Snag Grinder #1 Fabric Filter	EU77																		
CU22	ST12	Snag Grinder #2 Fabric Filter	EU78																		

Denotes secondary capture of emissions

Denotes emissions from control device are captured and vented out an alternative control device stack

Denotes emission unit is combined with another existing emission unit with CY2021 air permit application

Denotes emission unit, air pollution control device and/or stack are not installed at time of permit application

Denotes emission unit, air pollution control device and/or stack are not installed at time of permit application and will be combined with another unit

Table 2-3. Control Device, Stack and Emission Unit Description Cross Reference

Stack ID	Control Devi	Emission Unit #1	Emission Unit #2	Emission Unit #3	Emission Unit #4	Emission Unit #5	Emission Unit #6	Emission Unit #7	Emission Unit #8	Emission Unit #9	Emission Unit #10	Emission Unit #11	Emission Unit #12	Emission Unit #13	Emission Unit #14	Emission Unit #15	Emission Unit #16	Emission Unit #17	Emission Unit #18	Emission Unit #19	Emission Unit #20
ST02	Melt Baghouse	Scrap Steel Storage	Alloy Storage	~~Scrap Drying~~	~~Scrap Cleaning~~	Refractory Burner #1	Refractory Burner #2	Induction Furnace #1	Induction Furnace #2	Induction Furnace #3	Induction Furnace #4	~~Holding Furnace #1~~	~~Holding Furnace #2~~	Transport Ladle #1	Transport Ladle #2	Pouring Furnace #1	Pouring Furnace #2	Refractory Curing Mobile Burner			
ST03	Core/Mold Baghouse	Melt Shop Baghouse Waste Dust Silo																			
ST04	Mold Silica Sar	Mold Silica Sand Silo																			
ST05	Blend Silo Bin '	Blend Silo																			
ST06	Bentonite Silo	Bentonite Silo																			
ST07	Sand Plant Bag	Mold Silica Sand Bin	Blend Bin	Bentonite Bin	Mold Silica Sand Weigh Hopper	Blend Weigh Hopper	Bentonite Weigh Hopper	Dust Weigh Hopper	Green Sand Mixer #1	Green Sand Mixer #2	Green Sand Mixer #3	Shakeout Conveyor	Sand Cooler	Used Mold & Core Sand Storage	Sand Screening						
ST08	Acid Scrubber	PUCB Core Machine #1	PUCB Core Machine #2	PUCB Core Machine #3	PUCB Core Machine #4																
ST09	Core/Mold Bag	Mold Making #1	Mold Making #2	Sand Classifier	Core Silica Sand Bin	Core Silica Sand Weigh Hopper	Core Wash Station #1	Core Dryer #1	Core Dryer #2	Core Dryer #3	Core Dryer #4	Mold Assembly #1	Mold Assembly #2	Pouring #1	Pouring #2	Mold Cooling	Casting Cooling	Core Wash Station #2	Core Wash Station #3	Core Wash Station #4	
~~ST10~~	~~Core/Mold Ba~~	~~Mold Shop Baghouse Waste Dust Silo~~																			
ST11	Sand Plant Bag	Sand Plant Waste Sand Silo																			
ST12	Fettling Bagho	Sorting Conveyor	Steel Shot Blasting #1	Steel Shot Blasting #2	Auto Grinding #1	Auto Grinding #2															
ST13	Fettling Bagho	Fettling Baghouse Waste Dust Silo																			
ST16	Machining Car	Machining Lines (9)																			
ST16	Machining Car	Perforation Line #2																			
ST15A	Paint Line #3 B	Paint Line #3																			
ST15B	Paint Line #2 B	Paint Line #2																			
~~ST15C~~	~~Paint Line #4 B~~	~~Paint Line #4~~																			
ST16	Paint Line #1 B	Paint Line #1	Rust Preventative Application																		
ST09	Core Silica San	Core Silica Sand Silo A																			
ST09	Core Silica San	Core Silica Sand Silo B																			
STG1	Emergency Ge	Emergency Generator #1																			
STG2	Emergency Ge	Emergency Generator #2																			
STG3	Emergency Ge	Emergency Generator #3																			
~~STTK-1~~	~~Gasoline Stora~~	~~Gasoline Storage Tank~~																			
STTK-1	Diesel Storage	Diesel Storage Tank																			
FUG	Paved Roadwa	Paved Roadways																			
ST12	Snag Grinder #	Snag Grinder #1																			
ST12	Snag Grinder #	Snag Grinder #2																			

Denotes secondary capture of emissions
Denotes emissions from control device are captured and vented out an alternative control device stack
Denotes emission unit is combined with another existing emission unit with CY2021 air permit application
Denotes emission unit, air pollution control device and/or stack are not installed at time of permit application
Denotes emission unit, air pollution control device and/or stack are not installed at time of permit application and will be combined with another unit

Table 3-1. Hourly Emission Calculations

PROCESS	EU ID	Stack ID	Emissions Estimates - PSD Regulated Pollutants lbs/hr									
			PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO2e	
Charge Handling	EU01	ST02										Note 1
Refractory Burner #1	EU05	ST02				0.005	0.833	0.046	0.700	4.17E-06	1,000	Note 1
Refractory Burner #2	EU06	ST02				0.005	0.833	0.046	0.700	4.17E-06	1,000	Note 1
Induction Furnace #1	EU07	ST02						0.930	5.000			Note 1
Induction Furnace #2	EU08	ST02						0.930	5.000			Note 1
Induction Furnace #3	EU09	ST02						0.930	5.000			Note 1
Induction Furnace #4	EU10	ST02						0.930	5.000			Note 1
Hot Metal Transfer	EU13	ST02										Note 1
Pouring Furnace #1	EU15	ST02				*0.002*	*0.285*	*0.016*	*0.240*	*1.43E-06*	*342*	Note 1
Pouring Furnace #2	EU16	ST02				*0.002*	*0.285*	*0.016*	*0.240*	*1.43E-06*	*342*	Note 1
Melt Baghouse Dust Silo	EU17	ST03										Note 1
Refractory Curing Mobile Burner	EU18	ST02				*0.001*	*0.196*	*0.011*	*0.165*	*9.80E-07*	*235*	Note 1
Mold Silica Sand Silo	EU19	ST04										Note 1
Blend Silo	EU20	ST05										Note 1
Bentonite Silo	EU21	ST06										Note 1
Mold Sand Handling and Preparation	EU22	ST07										Note 1
Mold Making #1	EU33	ST09										Note 1
Mold Making #2	EU34	ST09										Note 1
Core Silica Sand Silo A	EU35A	ST09										Note 2
Core Silica Sand Silo B	EU35B	ST09										Note 2
Core Sand Handling and Preparation	EU36	ST09										Note 1
PUCB Core Machine #1(Resin and Catalyst)	EU39	ST08						0.986				Note 1
PUCB Core Machine #1 (Core Release)	EU39	ST08						3.570				
PUCB Core Machine #2(Resin and Catalyst)	EU40	ST08						*0.986*				Note 1
PUCB Core Machine #2 (Core Release)	EU40	ST08						*3.570*				
PUCB Core Machine #3(Resin and Catalyst)	EU41	ST08						*0.986*				Note 1
PUCB Core Machine #3 (Core Release)	EU41	ST08						*3.570*				
PUCB Core Machine #4(Resin and Catalyst)	EU42	ST08						0.986				Note 1
PUCB Core Machine #4 (Core Release)	EU42	ST08						3.570				
Core Wash Station #1	EU43	ST09						*5.130*				Note 1
Core Dryer #1	EU44	ST09				*0.002*	*0.392*	*0.022*	*0.329*	*1.96E-06*	*471*	Note 1
Core Dryer #2	EU45	ST09				*0.002*	*0.392*	*0.022*	*0.329*	*1.96E-06*	*471*	Note 1
Core Dryer #3	EU46	ST09				*0.002*	*0.392*	*0.022*	*0.329*	*1.96E-06*	*471*	Note 1
Core Dryer #4	EU47	ST09				*0.002*	*0.392*	*0.022*	*0.329*	*1.96E-06*	*471*	Note 1
Pouring #1	EU50	ST09				*0.253*	*0.127*	*6.325*	*63.250*	*0.006*		Note 1
Pouring #2	EU51	ST09				*0.253*	*0.127*	*6.325*	*63.250*	*0.006*		Note 1
Mold Cooling	EU52	ST09										Note 1
Shakeout Conveyor	EU53	ST07						*13.358*	*25.300*			Note 1
Sand Plant Waste Sand Silo	EU57	ST11										Note 1
Casting Cooling	EU59	ST09										Note 1
Sorting Conveyor	EU60	ST12										Note 1
Steel Shot Blasting #1	EU61	ST12										Note 1
Steel Shot Blasting #2	EU62	ST12										Note 1
Fettling Baghouse Waste Dust Silo	EU63	ST13										Note 1
Auto Grinding #1	EU64	ST12										Note 1
Auto Grinding #2	EU65	ST12										Note 1
Machining Lines (9)	EU66	ST16										Note 2
Perforation Line (1)	EU67	ST16										Note 2
Paint Line #3 (Coating)	EU68	ST15A						*0.748*				Note 1
Paint Line #3 (Thinner)	EU68	ST15A						*1.470*				
Paint Line #2(Coating)	EU69	ST15B						*0.748*				Note 1
Paint Line #2(Thinner)	EU69	ST15B						*1.470*				
Paint Line #1	EU71	ST16						*0.513*				Note 1
Emergency Generator #1	EU72	STG1	*1.05E-02*	*1.05E-02*	*1.05E-02*	*2.27E-01*	*4.80E-01*	*1.35E-02*	*1.28E-01*		*2.48E+01*	
Emergency Generator #2	EU73	STG2	*1.05E-02*	*1.05E-02*	*1.05E-02*	*2.28E-01*	*4.80E-01*	*1.35E-02*	*1.28E-01*		*2.48E+01*	
Emergency Generator #3	EU74	STG3				*2.32E-03*	*3.53E-02*	*2.80E-03*	*7.60E-03*		*1.31E+00*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Snag Grinder #1	EU77	ST12										Note 2
Snag Grinder #2	EU78	ST12										Note 2
Core Wash Station #2	EU79	ST09						*5.130*				
Core Wash Station #3	EU80	ST09						*5.130*				
Core Wash Station #4	EU81	ST09						*5.130*				
Rust Prohibitive Application	EU82	ST16						*2.500*				
Total Emissions			**0.02**	**0.02**	**0.02**	**0.99**	**5.25**	**77.09**	**175.42**	**0.01**	**4853.16**	
Melt Baghouse (CU01)	CU01	ST02	2.643	2.643	2.643	0.015	2.433	3.854	22.044	0.000	2920.000	
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)	CU02	ST03	0.015	0.015	0.015							
Mold Silica Sand Silo Bin Vent Filter (CU03)	CU03	ST04	0.015	0.015	0.015							
Blend Silo Bin Vent Filter (CU04)	CU04	ST05	0.015	0.015	0.015							
Bentonite Silo Bin Vent Filter (CU05)	CU05	ST06	0.015	0.015	0.015							
Sand Plant Baghouse (CU06)	CU06	ST07	2.208	2.208	2.208			13.358	25.300			
Acid Scrubber (CU07)	CU07	ST08	0.065	0.065	0.065			18.223				
Core/Mold Baghouse (CU08)	CU08	ST09	1.900	1.900	1.900	0.515	1.822	33.256	127.818	0.012	1882.353	
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)	CU10	ST11	0.015	0.015	0.015							
Fettling Baghouse (CU11)	CU11	ST12	0.573	0.573	0.573							
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)	CU12	ST13	0.015	0.015	0.015							
Machining Cartridge Collectors (CU13a-h)	CU13a-h	ST16	0.101	0.101	0.101							Note 2
Machining Cartridge Collectors (CU13i-j)	CU13i-j	ST16	0.101	0.101	0.101							Note 2
Paint Line #3 Booth Filter (CU14)	CU14	ST15A	0.023	0.023	0.023			2.218				
Paint Line #2 Booth Filter (CU15)	CU15	ST15B	0.023	0.023	0.023			2.218				
Paint Line #1 Booth Filter (CU17)	CU17	ST16	0.259	0.259	0.259			3.013				
Core Silica Sand Silo A Bin Vent Filter (CU19)	CU19	ST09	0.015	0.015	0.015							Note 2
Core Silica Sand Silo B Bin Vent Filter (CU20)	CU20	ST09	0.015	0.015	0.015							Note 2
Snag Grinder #1 Fabric Filter (CU21)	CU21	ST12	0.039	0.039	0.039							Note 2
Snag Grinder #2 Fabric Filter (CU22)	CU22	ST12	0.039	0.039	0.039							Note 2
Emergency Generator #1	EU72	STG1	1.05E-02	*1.05E-02*	*1.05E-02*	*0.227*	*0.480*	*0.014*	*0.128*		*24.750*	
Emergency Generator #2	EU73	STG2	1.05E-02	*1.05E-02*	*1.05E-02*	*0.228*	*0.480*	*0.014*	*0.128*		*24.750*	
Emergency Generator #3	EU74	STG3				*0.002*	*0.035*	*0.003*	*0.008*		*1.312*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Total Emissions			**7.83**	**7.83**	**7.83**	**0.99**	**5.25**	**77.09**	**175.42**	**0.01**	**4853.16**	Note 3

Note 1: PM, PM_{10} and $PM_{2.5}$ emissions are included in the emissions from the identified air pollution control device.

Note 2: Emissions from this air pollution control device are emitted inside the facility and subsequently captured via a second air pollution control device. Emissions are included in the project total as a portion of the emissions from the second control device.

Note 3: Total particulate emissons do not include the emissions from the emergency generators.

Table 3-2. Annual Emission Calculations

PROCESS	EU ID	Stack ID	Emissions Estimates - PSD Regulated Pollutants (Tons/Year) PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO2e	
Charge Handling	EU01	ST02										Note 1
Refractory Burner #1	EU05	ST02				0.022	3.650	0.201	3.066	1.83E-05	4,380	Note 1
Refractory Burner #2	EU06	ST02				0.022	3.650	0.201	3.066	1.83E-05	4,380	Note 1
Induction Furnace #1	EU07	ST02						1.065	5.724			Note 1
Induction Furnace #2	EU08	ST02						1.065	5.724			Note 1
Induction Furnace #3	EU09	ST02						1.065	5.724			Note 1
Induction Furnace #4	EU10	ST02						1.065	5.724			Note 1
Hot Metal Transfer	EU13	ST02										Note 1
Pouring Furnace #1	EU15	ST02				*0.007*	*1.250*	*0.069*	*1.050*	*6.25E-06*	*1,500*	Note 1
Pouring Furnace #2	EU16	ST02				*0.007*	*1.250*	*0.069*	*1.050*	*6.25E-06*	*1,500*	Note 1
Melt Baghouse Dust Silo	EU17	ST03										Note 1
Refractory Curing Mobile Burner	EU18	ST02				*0.005*	*0.859*	*0.047*	*0.721*	*4.29E-06*	*1,031*	Note 1
Mold Silica Sand Silo	EU19	ST04										Note 1
Blend Silo	EU20	ST05										Note 1
Bentonite Silo	EU21	ST06										Note 1
Mold Sand Handling and Preparation	EU22	ST07										Note 1
Mold Making #1	EU33	ST09										Note 1
Mold Making #2	EU34	ST09										Note 1
Core Silica Sand Silo A	EU35A	ST09										Note 1
Core Silica Sand Silo B	EU35B	ST09										Note 1
Core Sand Handling and Preparation	EU36	ST09										Note 1
PUCB Core Machine #1(Resin and Catalyst)	EU39	ST08						1.782				Note 1
PUCB Core Machine #1 (Core Release)	EU39	ST08						6.545				
PUCB Core Machine #2(Resin and Catalyst)	EU40	ST08						*1.782*				Note 1
PUCB Core Machine #2 (Core Release)	EU40	ST08						*6.545*				
PUCB Core Machine #3(Resin and Catalyst)	EU41	ST08						*1.782*				Note 1
PUCB Core Machine #3 (Core Release)	EU41	ST08						*6.545*				
PUCB Core Machine #4(Resin and Catalyst)	EU42	ST08						1.782				Note 1
PUCB Core Machine #4 (Core Release)	EU42	ST08						6.545				Note 1
Core Wash Station #1	EU43	ST09						*1.026*				Note 1
Core Dryer #1	EU44	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2,061*	Note 1
Core Dryer #2	EU45	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2,061*	Note 1
Core Dryer #3	EU46	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2,061*	Note 1
Core Dryer #4	EU47	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2,061*	Note 1
Pouring #1	EU50	ST09				*0.458*	*0.229*	*11.448*	*114.483*	*0.011*		Note 1
Pouring #2	EU51	ST09				*0.458*	*0.229*	*11.448*	*114.483*	*0.011*		Note 1
Mold Cooling	EU52	ST09										Note 1
Shakeout Conveyor	EU53	ST07						*24.179*	*45.793*			Note 1
Sand Plant Waste Sand Silo	EU57	ST11										Note 1
Casting Cooling	EU59	ST09										Note 1
Sorting Conveyor	EU60	ST12										Note 1
Steel Shot Blasting #1	EU61	ST12										Note 1
Steel Shot Blasting #2	EU62	ST12										Note 1
Fettling Baghouse Waste Dust Silo	EU63	ST13										Note 1
Auto Grinding #1	EU64	ST12										Note 1
Auto Grinding #2	EU65	ST12										Note 1
Machining Lines (9)	EU66	ST16										Note 2
Perforation Line (1)	EU67	ST16										Note 2
Paint Line #3 (Coating)	EU68	ST15A						3.274				Note 1
Paint Line #3 (Thinner)	EU68	ST15A						6.439				
Paint Line #2(Coating)	EU69	ST15B						*3.274*				Note 1
Paint Line #2(Thinner)	EU69	ST15B						*6.439*				
Paint Line #1	EU71	ST16						*2.244*				Note 1
Emergency Generator #1	EU72	STG1	*5.23E-04*	*5.23E-04*	*5.23E-04*	*1.14E-02*	*2.40E-02*	*6.75E-04*	*6.38E-03*		*1.24E+00*	
Emergency Generator #2	EU73	STG2	*5.23E-04*	*5.23E-04*	*5.23E-04*	*1.14E-02*	*2.40E-02*	*6.75E-04*	*6.38E-03*		*1.24E+00*	
Emergency Generator #3	EU74	STG3				*1.16E-04*	*1.76E-03*	*1.40E-04*	*3.80E-04*		*6.56E-02*	
Diesel Storage Tank	EU75	STTK1						*0.069*				
Snag Grinder #1	EU77	ST12										Note 2
Snag Grinder #2	EU78	ST12										Note 2
Core Wash Station #2	EU79	ST09						*1.026*				
Core Wash Station #3	EU80	ST09						*1.026*				
Core Wash Station #4	EU81	ST09						*1.026*				
Rust Prohibitive Application	EU82	ST16						*1.000*				
Total Emissions			**0.00**	**0.00**	**0.00**	**1.04**	**18.04**	**112.45**	**312.39**	**0.02**	**21036.85**	
Melt Baghouse (CU01)	CU01	ST02	*11.577*	*11.577*	*11.577*	*0.064*	*10.658*	*4.845*	*31.849*	*0.000*	*12789.600*	
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)	CU02	ST03	*0.068*	*0.068*	*0.068*							
Mold Silica Sand Silo Bin Vent Filter (CU03)	CU03	ST04	*0.0010*	*0.0010*	*0.0010*							
Blend Silo Bin Vent Filter (CU04)	CU04	ST05	*0.0010*	*0.0010*	*0.0010*							
Bentonite Silo Bin Vent Filter (CU05)	CU05	ST06	*0.0010*	*0.0010*	*0.0010*							
Sand Plant Baghouse (CU06)	CU06	ST07	*9.673*	*9.673*	*9.673*			*24.179*	*45.793*			
Acid Scrubber (CU07)	CU07	ST08	*0.283*	*0.283*	*0.283*			*33.309*				
Core/Mold Baghouse (CU08)	CU08	ST09	*8.321*	*8.321*	*8.321*	*0.957*	*7.329*	*27.378*	*234.736*	*0.022*	*8244.706*	
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)	CU10	ST11	*0.068*	*0.068*	*0.068*							
Fettling Baghouse (CU11)	CU11	ST12	*2.511*	*2.511*	*2.511*							
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)	CU12	ST13	*0.068*	*0.068*	*0.068*							
Machining Cartridge Collectors (CU13a-h)	CU13a-h	ST16	*0.443*	*0.443*	*0.443*							Note 2
Machining Cartridge Collectors (CU13i-j)	CU13i-j	ST16	*0.443*	*0.443*	*0.443*							Note 2
Paint Line #3 Booth Filter (CU14)	CU14	ST15A	*0.101*	*0.101*	*0.101*			*9.713*				
Paint Line #2 Booth Filter (CU15)	CU15	ST15B	*0.101*	*0.101*	*0.101*			*9.713*				
Paint Line #1 Booth Filter (CU17)	CU17	ST16	*1.133*	*1.133*	*1.133*			*3.244*				
Core Silica Sand Silo A Bin Vent Filter (CU19)	CU19	ST09	*0.001*	*0.001*	*0.001*							Note 2
Core Silica Sand Silo B Bin Vent Filter (CU20)	CU20	ST09	*0.001*	*0.001*	*0.001*							Note 2
Snag Grinder #1 Fabric Filter (CU21)	CU21	ST12	*0.170*	*0.170*	*0.170*							Note 2
Snag Grinder #2 Fabric Filter (CU22)	CU22	ST12	*0.170*	*0.170*	*0.170*							Note 2
Emergency Generator #1	EU72	STG1	*5.23E-04*	*5.23E-04*	*5.23E-04*	*0.011*	*0.024*	*0.001*	*0.006*		*1.238*	
Emergency Generator #2	EU73	STG2	*5.23E-04*	*5.23E-04*	*5.23E-04*	*0.011*	*0.024*	*0.001*	*0.006*		*1.238*	
Emergency Generator #3	EU74	STG3				*0.000*	*0.002*	*0.000*	*0.000*		*0.066*	
Diesel Storage Tank	EU75	STTK1						*0.069*				
Total Emissions			**33.91**	**33.91**	**33.91**	**1.04**	**18.04**	**112.45**	**312.39**	**0.02**	**21036.85**	Note 3

Note 1: PM, PM_{10} and $PM_{2.5}$ emissions are included in the emissions from the identified air pollution control device.

Note 2: Emissions from this air pollution control device are emitted inside the facility and subsequently captured via a second air pollution control device. Emissions are included in the project total as a portion of the emissions from the second control device.

Note 3: Total particulate emissons do not include the emissions from the emergency generators.

Table 5-1. Project Emissions Increase

Pollutant	PSD SER (tpy)	2021 Permit Revision	
		Emissions Increase (tpy)	PSD Permitting Required? (Yes/No)
Filterable PM	25	33.91	Yes
PM_{10}	15	33.91	Yes
$PM_{2.5}$	10	33.91	Yes
SO_2	40	1.04	No
NO_x	40	18.04	No
VOC	40	112.45	Yes
CO	100	312.39	Yes
Lead	0.6	0.02	No

Table 5-2. Emissions by Emission Unit and by Stack

PROCESS	EU ID	Stack ID	Emissions Estimates - PSD Regulated Pollutants (Tons/Year) PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO2e	
Charge Handling	EU01	ST02										Note 1
Refractory Burner #1	EU05	ST02				0.022	3.650	0.201	3.066	1.83E-05	4,380	Note 1
Refractory Burner #2	EU06	ST02				0.022	3.650	0.201	3.066	1.83E-05	4,380	Note 1
Induction Furnace #1	EU07	ST02						1.065	5.724			Note 1
Induction Furnace #2	EU08	ST02						1.065	5.724			Note 1
Induction Furnace #3	EU09	ST02						1.065	5.724			Note 1
Induction Furnace #4	EU10	ST02						1.065	5.724			Note 1
Hot Metal Transfer	EU13	ST02										Note 1
Pouring Furnace #1	EU15	ST02				*0.007*	*1.250*	*0.069*	*1.050*	*6.25E-06*	*1,500*	Note 1
Pouring Furnace #2	EU16	ST02				*0.007*	*1.250*	*0.069*	*1.050*	*6.25E-06*	*1,500*	Note 1
Melt Baghouse Dust Silo	EU17	ST03										Note 1
Refractory Curing Mobile Burner	EU18	ST02				*0.005*	*0.859*	*0.047*	*0.721*	*4.29E-06*	*1,031*	Note 1
Mold Silica Sand Silo	EU19	ST04										Note 1
Blend Silo	EU20	ST05										Note 1
Bentonite Silo	EU21	ST06										Note 1
Mold Sand Handling and Preparation	EU22	ST07										Note 1
Mold Making #1	EU33	ST09										Note 1
Mold Making #2	EU34	ST09										Note 1
Core Silica Sand Silo A	EU35A	ST09										Note 1
Core Silica Sand Silo B	EU35B	ST09										Note 1
Core Sand Handling and Preparation	EU36	ST09										Note 1
PUCB Core Machine #1(Resin and Catalyst)	EU39	ST08						1.782				Note 1
PUCB Core Machine #1 (Core Release)	EU39	ST08						6.545				
PUCB Core Machine #2(Resin and Catalyst)	EU40	ST08						*1.782*				Note 1
PUCB Core Machine #2 (Core Release)	EU40	ST08						*6.545*				
PUCB Core Machine #3(Resin and Catalyst)	EU41	ST08						*1.782*				Note 1
PUCB Core Machine #3 (Core Release)	EU41	ST08						*6.545*				
PUCB Core Machine #4(Resin and Catalyst)	EU42	ST08						1.782				Note 1
PUCB Core Machine #4 (Core Release)	EU42	ST08						6.545				Note 1
Core Wash Station #1	EU43	ST09						*1.026*				Note 1
Core Dryer #1	EU44	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2,061*	Note 1
Core Dryer #2	EU45	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2,061*	Note 1
Core Dryer #3	EU46	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2,061*	Note 1
Core Dryer #4	EU47	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2,061*	Note 1
Pouring #1	EU50	ST09				*0.458*	*0.229*	*11.448*	*114.483*	*0.011*		Note 1
Pouring #2	EU51	ST09				*0.458*	*0.229*	*11.448*	*114.483*	*0.011*		Note 1
Mold Cooling	EU52	ST09										Note 1
Shakeout Conveyor	EU53	ST07						*24.179*	*45.793*			Note 1
Sand Plant Waste Sand Silo	EU57	ST11										Note 1
Casting Cooling	EU59	ST09										Note 1
Sorting Conveyor	EU60	ST12										Note 1
Steel Shot Blasting #1	EU61	ST12										Note 1
Steel Shot Blasting #2	EU62	ST12										Note 1
Fettling Baghouse Waste Dust Silo	EU63	ST13										Note 1
Auto Grinding #1	EU64	ST12										Note 1
Auto Grinding #2	EU65	ST12										Note 1
Machining Lines (9)	EU66	ST16										Note 2
Perforation Line (1)	EU67	ST16										Note 2
Paint Line #3 (Coating)	EU68	ST15A						3.274				Note 1
Paint Line #3 (Thinner)	EU68	ST15A						6.439				
Paint Line #2(Coating)	EU69	ST15B						*3.274*				Note 1
Paint Line #2(Thinner)	EU69	ST15B						*6.439*				
Paint Line #1	EU71	ST16						*2.244*				Note 1
Emergency Generator #1	EU72	STG1	*5.23E-04*	*5.23E-04*	*5.23E-04*	*1.14E-02*	*2.40E-02*	*6.75E-04*	*6.38E-03*		*1.24E+00*	
Emergency Generator #2	EU73	STG2	*5.23E-04*	*5.23E-04*	*5.23E-04*	*1.14E-02*	*2.40E-02*	*6.75E-04*	*6.38E-03*		*1.24E+00*	
Emergency Generator #3	EU74	STG3				*1.16E-04*	*1.76E-03*	*1.40E-04*	*3.80E-04*		*6.56E-02*	
Diesel Storage Tank	EU75	STTK1						*0.069*				
Snag Grinder #1	EU77	ST12										Note 2
Snag Grinder #2	EU78	ST12										Note 2
Core Wash Station #2	EU79	ST09						*1.026*				
Core Wash Station #3	EU80	ST09						*1.026*				
Core Wash Station #4	EU81	ST09						*1.026*				
Rust Prohibitive Application	EU82	ST16						*1.000*				
Total Emissions			**0.00**	**0.00**	**0.00**	**1.04**	**18.04**	**112.45**	**312.39**	**0.02**	**21036.85**	
Melt Baghouse (CU01)	CU01	ST02	*11.577*	*11.577*	*11.577*	*0.064*	*10.658*	*4.845*	*31.849*	*0.000*	*12789.600*	
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)	CU02	ST03	*0.068*	*0.068*	*0.068*							
Mold Silica Sand Silo Bin Vent Filter (CU03)	CU03	ST04	*0.0010*	*0.0010*	*0.0010*							
Blend Silo Bin Vent Filter (CU04)	CU04	ST05	*0.0010*	*0.0010*	*0.0010*							
Bentonite Silo Bin Vent Filter (CU05)	CU05	ST06	*0.0010*	*0.0010*	*0.0010*							
Sand Plant Baghouse (CU06)	CU06	ST07	*9.673*	*9.673*	*9.673*			*24.179*	*45.793*			
Acid Scrubber (CU07)	CU07	ST08	*0.283*	*0.283*	*0.283*			*33.309*				
Core/Mold Baghouse (CU08)	CU08	ST09	*8.321*	*8.321*	*8.321*	*0.957*	*7.329*	*27.378*	*234.736*	*0.022*	*8244.706*	
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)	CU10	ST11	*0.068*	*0.068*	*0.068*							
Fettling Baghouse (CU11)	CU11	ST12	*2.511*	*2.511*	*2.511*							
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)	CU12	ST13	*0.068*	*0.068*	*0.068*							
Machining Cartridge Collectors (CU13a-h)	CU13a-h	ST16	*0.443*	*0.443*	*0.443*							Note 2
Machining Cartridge Collectors (CU13i-j)	CU13i-j	ST16	*0.443*	*0.443*	*0.443*							Note 2
Paint Line #3 Booth Filter (CU14)	CU14	ST15A	*0.101*	*0.101*	*0.101*			*9.713*				
Paint Line #2 Booth Filter (CU15)	CU15	ST15B	*0.101*	*0.101*	*0.101*			*9.713*				
Paint Line #1 Booth Filter (CU17)	CU17	ST16	*1.133*	*1.133*	*1.133*			*3.244*				
Core Silica Sand Silo A Bin Vent Filter (CU19)	CU19	ST09	*0.001*	*0.001*	*0.001*							Note 2
Core Silica Sand Silo B Bin Vent Filter (CU20)	CU20	ST09	*0.001*	*0.001*	*0.001*							Note 2
Snag Grinder #1 Fabric Filter (CU21)	CU21	ST12	*0.170*	*0.170*	*0.170*							Note 2
Snag Grinder #2 Fabric Filter (CU22)	CU22	ST12	*0.170*	*0.170*	*0.170*							Note 2
Emergency Generator #1	EU72	STG1	*5.23E-04*	*5.23E-04*	*5.23E-04*	*0.011*	*0.024*	*0.001*	*0.006*		*1.238*	
Emergency Generator #2	EU73	STG2	*5.23E-04*	*5.23E-04*	*5.23E-04*	*0.011*	*0.024*	*0.001*	*0.006*		*1.238*	
Emergency Generator #3	EU74	STG3				*0.000*	*0.002*	*0.000*	*0.000*		*0.066*	
Diesel Storage Tank	EU75	STTK1						*0.069*				
Total Emissions			**33.91**	**33.91**	**33.91**	**1.04**	**18.04**	**112.45**	**312.39**	**0.02**	**21036.85**	Note 3

Note 1: PM, PM_{10} and $PM_{2.5}$ emissions are included in the emissions from the identified air pollution control device.

Note 2: Emissions from this air pollution control device are emitted inside the facility and subsequently captured via a second air pollution control device. Emissions are included in the project total as a portion of the emissions from the second control device.

Note 3: Total particulate emissons do not include the emissions from the emergency generators.

Table 5-3. Emission Unit and Pollutants with PSD SER

Emission Unit	Description	PM PM_{10} $PM_{2.5}$	VOC	CO
EU01	Charge Handling	X		
EU05	Refractory Burner #1	X	X	X
EU06	Refractory Burner #2	X	X	X
EU07	Induction Furnace #1	X	X	X
EU08	Induction Furnace #2	X	X	X
EU09	Induction Furnace #3	X	X	X
EU10	Induction Furnace #4	X	X	X
EU13	Hot Metal Transfer	X		
EU15	Pouring Furnace #1	X	X	X
EU16	Pouring Furnace #2	X	X	X
EU17	Melt Baghouse Waste Dust Silo	X		
EU18	Refractory Curing Mobile Burner	X	X	X
EU19	Mold Silica Sand Silo	X		
EU20	Blend Silo	X		
EU21	Bentonite Silo	X		
EU22	Mold Sand Handling and Preparation	X		
EU33	Mold Making #1	X		
EU34	Mold Making #2	X		
EU35A	Core Silica Sand Silo A	X		
EU35B	Core Silica Sand Silo B	X		
EU36	Core Sand Handling and Preparation	X		
EU39	PUCB Core Machine #1	X	X	
EU40	PUCB Core Machine #2	X	X	
EU41	PUCB Core Machine #3	X	X	
EU42	PUCB Core Machine #4	X	X	
EU43	Core Wash Station #1		X	
EU44	Core Dryer #1	X	X	X
EU45	Core Dryer #2	X	X	X
EU46	Core Dryer #3	X	X	X
EU47	Core Dryer #4	X	X	X
EU50	Pouring #1	X	X	X
EU51	Pouring #2	X	X	X
EU52	Mold Cooling	X	X	X
EU53	Shakeout Conveyor	X	X	X
EU57	Sand Plant Waste Sand Silo	X		
EU59	Casting Cooling	X		
EU60	Sorting Conveyor	X		
EU61	Steel Shot Blasting #1	X		
EU62	Steel Shot Blasting #2	X		
EU63	Fettling Baghouse Waste Dust Silo	X		
EU64	Auto Grinding #1	X		
EU65	Auto Grinding #2	X		
EU66	Machining Lines (9)	X		
EU67	Perforation Lines (1)	X		
EU68	Paint Line #3	X	X	
EU69	Paint Line #2	X	X	
EU71	Paint Line #1	X	X	
EU72	Emergency Generator #1	X	X	X
EU73	Emergency Generator #2	X	X	X
EU74	Emergency Generator #3	X	X	X
EU75	Diesel Storage Tank		X	
EU77	Snag Grinder #1	X		
EU78	Snag Grinder #2	X		
EU79	Core Wash Station #2		X	
EU80	Core Wash Station #3		X	
EU81	Core Wash Station #4		X	
EU82	Rust Preventative Application		X	

Table 5-4. Units Emitting Particulate Matter

Emission Unit	Description
EU01	**Charge Handling**
EU05	Refractory Burner #1
EU06	Refractory Burner #2
EU07	**Induction Furnace #1**
EU08	**Induction Furnace #2**
EU09	**Induction Furnace #3**
EU10	**Induction Furnace #4**
EU13	**Hot Metal Transfer**
EU15	Pouring Furnace #1
EU16	Pouring Furnace #2
EU17	Melt Baghouse Waste Dust Silo
EU18	Refractory Curing Mobile Burner
EU19	Mold Silica Sand Silo
EU20	Blend Silo
EU21	Bentonite Silo
EU22	**Mold Sand Handling and Preparation**
EU33	**Mold Making #1**
EU34	**Mold Making #2**
EU35A	**Core Silica Sand Silo A**
EU35B	**Core Silica Sand Silo B**
EU36	**Core Sand Handling and Preparation**
EU39	PUCB Core Machine #1
EU40	PUCB Core Machine #2
EU41	PUCB Core Machine #3
EU42	PUCB Core Machine #4
EU44	Core Dryer #1
EU45	Core Dryer #2
EU46	Core Dryer #3
EU47	Core Dryer #4
EU50	**Pouring #1**
EU51	**Pouring #2**
EU52	**Mold Cooling**
EU53	**Shakeout**
EU57	Sand Plant Waste Sand Silo
EU59	Casting Cooling
EU60	Sorting Conveyor
EU61	Steel Shot Blasting #1
EU62	Steel Shot Blasting #2
EU63	Fettling Baghouse Waste Dust Silo
EU64	Auto Grinding #1
EU65	Auto Grinding #2
EU66	Machining Lines (9)
EU67	Perforation Lines (1)
EU68	Paint Line #3
EU69	Paint Line #2
EU71	Paint Line #1
EU72	Emergency Generator #1
EU73	Emergency Generator #2
EU74	Emergency Generator #3
EU77	Snag Grinder #1
EU78	Snag Grinder #2

Table 5-5. Particulate Matter - RBLC Determinations

RBLCID	FACILITY NAME	PROCESS NAME	PROCESS TYPE	THRUPUT	THRUPUT UNITS	POLLUTANT	CONTROL METHOD CODE	CONTROL METHOD DESCRIPTION	EMISSION LIMIT 1	EMISSION LIMIT 1 UNIT	PERCENT EFFICIENCY	COMPLIANCE VERIFIED
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Particulate Matter (PM)	A	SCRUBBER AND BAGHOUSE	0.006	GR/DSCF	0	U
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Particulate Matter (PM)	A	SCRUBBER AND BAGHOUSE	0.006	GR/DSCF	0	U
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Particulate Matter (PM)	A	SCRUBBER AND BAGHOUSE	0.006	GR/DSCF	0	U
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Particulate Matter (PM)	A	SCRUBBER AND BAGHOUSE	0.006	GR/DSCF	0	U
IA-0093	DEXTER FOUNDRY, INC.	INDUCTION FURNACE	81.42	8.7	T/H	Particulate Matter (PM)	A	BAGHOUSE	0.042	LB/T	0	U
IA-0093	DEXTER FOUNDRY, INC.	INDUCTION FURNACE	81.42	8.7	T/H	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.042	LB/T	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGMACTZZZZZ	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.1	LB/T	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMACTZZZZZ	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.1	LB/T	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMACTZZZZZ	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.1	LB/T	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMACTZZZZZ	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.1	LB/T	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMACTZZZZZ	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.1	LB/T	99	N
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MELTING AND POURING (EU-MP)	81.42	115500	T/YR	Particulate Matter (PM)	A	HOODS, ENCLOSURES, DUCTWORK AND A 37,500 ACFM BAGHOUSE.	0.3	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MELTING AND POURING (EU-MP)	81.42	115500	T/YR	Particulate Matter (PM)	A	HOODS, ENCLOSURES, DUCTWORK AND A 37,500 ACFM BAGHOUSE.	0.3	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MELTING AND POURING (EU-MP)	81.42	115500	T/YR	Particulate Matter (PM)	A	HOODS, ENCLOSURES, DUCTWORK AND A 37,500 ACFM BAGHOUSE.	0.3	LB/H	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.7	LB/H	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.7	LB/H	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.7	LB/H	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.7	LB/H	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.7	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF E	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF E	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF E	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF E	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF E	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 10 µ (TPM10)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, filterable (FPM)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 10 µ (TPM10)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, filterable (FPM)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 10 µ (TPM10)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, filterable (FPM)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 10 µ (TPM10)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N

MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, filterable (FPM)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 10 µ (TPM10)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, filterable (FPM)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
IN-0136	THYSSENKRUPP WAPUPACA, INC.	16 TON IRON BATH DESULFURIZATION LADLE OPERATION	81.43	100	T/H	Particulate matter, filterable (FPM)	A	FABRIC FILTER BAGHOUSE	0.005	GR/DSCF	99.9	U
IN-0136	THYSSENKRUPP WAPUPACA, INC.	16 TON IRON BATH DESULFURIZATION LADLE OPERATION	81.43	100	T/H	Particulate matter, filterable (FPM)	A	FABRIC FILTER BAGHOUSE	0.005	GR/DSCF	99.9	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA CORE SAND STORAGE SILO (EU-201)	81.44	30	T/H OF CORE SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.001	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA CORE SAND STORAGE SILO (EU-201)	81.44	30	T/H OF CORE SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.001	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA CORE SAND STORAGE SILO (EU-201)	81.44	30	T/H OF CORE SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.001	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA CORE SAND STORAGE SILO (EU-201)	81.44	30	T/H OF CORE SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.001	LB/H	0	
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse F limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse F	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse F limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse F	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse F limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse F	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM-Baghouse G limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse G	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM-Baghouse G limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse G	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM-Baghouse G limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse G	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA BOND AND SAND STORAGE SILO (EU-202)	81.44	0		Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.04	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA NEW SAND DAY BIN (EU-DNS)	81.44	10	T/H OF SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BING VENT FILTERS	0.04	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA BOND AND SAND STORAGE SILO (EU-202)	81.44	0		Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.04	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA NEW SAND DAY BIN (EU-DNS)	81.44	10	T/H OF SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BING VENT FILTERS	0.04	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA BOND AND SAND STORAGE SILO (EU-202)	81.44	0		Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.04	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA NEW SAND DAY BIN (EU-DNS)	81.44	10	T/H OF SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BING VENT FILTERS	0.04	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA BOND AND SAND STORAGE SILO (EU-202)	81.44	0		Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.04	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA NEW SAND DAY BIN (EU-DNS)	81.44	10	T/H OF SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BING VENT FILTERS	0.04	LB/H	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.31	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.31	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.31	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.31	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.31	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.31	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.31	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.31	LB/HR	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MOLD MACHINE AND SAND HANDLING (EU-SS)	81.44			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 50,900 ASCM BAGHOUSE.	2.3	LB/H	99	U

MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MOLD MACHINE AND SAND HANDLING (EU-SS)	81.44			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 50,900 ASCM BAGHOUSE.	2.3	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MOLD MACHINE AND SAND HANDLING (EU-SS)	81.44			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 50,900 ASCM BAGHOUSE.	2.3	LB/H	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse F limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse F	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse F limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse F	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse F limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse F	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM-Baghouse G limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse G	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM-Baghouse G limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse G	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM-Baghouse G limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse G	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse F limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse F	0.002	GR/DSCF	99

MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA CORE SAND STORAGE SILO (EU-201)	81.44	30	T/H OF CORE SAND	Particulate matter, filterable (FPM)	A	BIN VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA BOND AND SAND STORAGE SILO (EU-202)	81.44	0		Particulate matter, filterable (FPM)	A	BIN VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA NEW SAND DAY BIN (EU-DNS)	81.44	10	T/H OF SAND	Particulate matter, filterable (FPM)	A	BING VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA CORE SAND STORAGE SILO (EU-201)	81.44	30	T/H OF CORE SAND	Particulate matter, filterable (FPM)	A	BIN VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA BOND AND SAND STORAGE SILO (EU-202)	81.44	0		Particulate matter, filterable (FPM)	A	BIN VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA NEW SAND DAY BIN (EU-DNS)	81.44	10	T/H OF SAND	Particulate matter, filterable (FPM)	A	BING VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA CORE SAND STORAGE SILO (EU-201)	81.44	30	T/H OF CORE SAND	Particulate matter, filterable (FPM)	A	BIN VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA BOND AND SAND STORAGE SILO (EU-202)	81.44	0		Particulate matter, filterable (FPM)	A	BIN VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA NEW SAND DAY BIN (EU-DNS)	81.44	10	T/H OF SAND	Particulate matter, filterable (FPM)	A	BING VENT FILTERS	0.003	GR/DSCF OF*	0	U
WI-0236	THYSSEN KRUPP PLANT #4	DISA LINES #4 & #5	81.44			Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.005	GR/ACF	99	N
WI-0238	THYSSEN KRUPP PLANT #1	SAND MULLORS	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0238	THYSSEN KRUPP PLANT #1	SAND HANDLING	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	SAND MULLORS	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0238	THYSSEN KRUPP PLANT #1	SAND HANDLING	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	SAND MULLORS	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0238	THYSSEN KRUPP PLANT #1	SAND HANDLING	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0236	THYSSEN KRUPP PLANT #4	DISA LINES #4 & #5	81.44			Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.005	GR/ACF	99	N
WI-0238	THYSSEN KRUPP PLANT #1	SAND MULLORS	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0238	THYSSEN KRUPP PLANT #1	SAND HANDLING	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUMLTXFER	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Two baghouses (A and B)	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUMLTXFER	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Two baghouses (A and B)	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUMLTXFER	81.45	0		Particulate matter, filterable (FPM)	A	Two baghouses (A and B)	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouse D limits	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N

MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouse D limits	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouse D limits	81.45	0		Particulate matter, filterable (FPM)	B	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUMLTXFER	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Two baghouses (A and B)	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUMLTXFER	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Two baghouses (A and B)	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUMLTXFER	81.45	0		Particulate matter, filterable (FPM)	A	Two baghouses (A and B)	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouse D limits	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N

*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.76	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.76	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.76	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.76	LB/HR	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	5.14	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Bahouse	5.14	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	5.14	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Bahouse	5.14	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	5.14	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Bahouse	5.14	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	5.14	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Bahouse	5.14	LB/HR	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouse D limits	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouse D limits	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouse D limits	81.45	0		Particulate matter, filterable (FPM)	B	Baghouse D	0.002	GR/DSCF	99	N
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF *	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF *	0	U
WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35A Line 2 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35A Line 2 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF *	0	U
WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35A Line 2 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35B Line 1 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF*	0	U

IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF *	0	U
WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35A Line 2 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35A Line 2 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF *	0	U
WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35A Line 2 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35B Line 1 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N

MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-11)	1	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-11)	1	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-11)	1	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-11)	1	LB/H	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.29	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.29	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.29	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.29	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.29	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.29	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.29	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.29	LB/HR	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable < 10 µ (FPM10)	A	2 BAGHOUSES (DC-6 & DC-7)	4.6	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable < 10 µ (FPM10)	A	2 BAGHOUSES (DC-6 & DC-7)	4.6	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable < 10 µ (FPM10)	A	2 BAGHOUSES (DC-6 & DC-7)	4.6	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable < 10 µ (FPM10)	A	2 BAGHOUSES (DC-6 & DC-7)	4.6	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable (FPM)	A	2 BAGHOUSES (DC-6 & DC-7)	0.003	GR/DSCF	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-11)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable (FPM)	A	2 BAGHOUSES (DC-6 & DC-7)	0.003	GR/DSCF	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-11)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable (FPM)	A	2 BAGHOUSES (DC-6 & DC-7)	0.003	GR/DSCF	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-11)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable (FPM)	A	2 BAGHOUSES (DC-6 & DC-7)	0.003	GR/DSCF	0	U

IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-11)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable (FPM)	A	2 BAGHOUSES (DC-6 & DC-7)	0.003	GR/DSCF	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-11)	0.003	GR/DSCF OF*	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	SHAKEOUT	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	CAST COOLING	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	SHAKEOUT	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	CAST COOLING	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-8)	0.003	GR/DSCF OF*	0	U

IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-8)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-8)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-8)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-8)	0.003	GR/DSCF OF*	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUGRIND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUGRIND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUGRIND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
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MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
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MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
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MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse H and J	0.001	GR/DSCF	99	N
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MI-0429	EAST JORDAN FOUNDRY LLC	EUGRIND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
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MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUGRIND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUGRIND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUGRIND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, filterable (FPM)	A	bAGHOUSE k	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B associated with charge handling.	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF*	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E portion of charge handling operations	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse E portion of charge handling operations.	0.002	GR/DSCF	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF*	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, filterable (FPM)	A	bAGHOUSE k	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF*	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B associated with charge handling.	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E portion of charge handling operations	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse E portion of charge handling operations.	0.002	GR/DSCF	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N

MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF*	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, filterable (FPM)	A	bAGHOUSE k	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF*	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
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MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, filterable (FPM)	A	bAGHOUSE k	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B associated with charge handling.	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E portion of charge handling operations	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse E portion of charge handling operations.	0.002	GR/DSCF	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, filterable (FPM)	A	bAGHOUSE k	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B associated with charge handling.	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E portion of charge handling operations	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse E portion of charge handling operations.	0.002	GR/DSCF	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
IN-0136	THYSSENKRUPP WAPUPACA, INC.	DUCTILE IRON TREATMENT STATIONS	81.49	50	T/H EACH	Particulate matter, filterable (FPM)	A	BAGHOUSE	0.005	GR/DSCF	99.9	U

MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse K	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-12)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-12)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-12)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-12)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-12)	0.003	GR/DSCF OF*	0	U
IN-0136	THYSSENKRUPP WAPUPACA, INC.	DUCTILE IRON TREATMENT STATIONS	81.49	50	T/H EACH	Particulate matter, filterable (FPM)	A	BAGHOUSE	0.005	GR/DSCF	99.9	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P73 - Line 5 Cast Cooling	81.49	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P73 - Line 5 Cast Cooling	81.49	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P73 - Line 5 Cast Cooling	81.49	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P73 - Line 5 Cast Cooling	81.49	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P73 - Line 5 Cast Cooling	81.49	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P73 - Line 5 Cast Cooling	81.49	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P73 - Line 5 Cast Cooling	81.49	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.13	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.13	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.13	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.13	LB/H	0	
IN-0189	WAUPACA FOUNDRY, INC PLANT 5	LINE 1 LADLE CLEANING OPERATION (P86A) AND LINE 4 LADLE CLEANING OPERATION (P86B)	81.49	100	LBS/H BURN BARS	Particulate matter, total (TPM)	A	BAGHOUSE	0.64	LB/H	99	U
IN-0189	WAUPACA FOUNDRY, INC PLANT 5	LINE 1 LADLE CLEANING OPERATION (P86A) AND LINE 4 LADLE CLEANING OPERATION (P86B)	81.49	100	LBS/H BURN BARS	Particulate matter, total < 10 µ (TPM10)	A	BAGHOUSE	0.64	LB/H	99	
IN-0189	WAUPACA FOUNDRY, INC PLANT 5	LINE 1 LADLE CLEANING OPERATION (P86A) AND LINE 4 LADLE CLEANING OPERATION (P86B)	81.49	100	LBS/H BURN BARS	Particulate matter, total < 2.5 µ (TPM2.5)	A	BAGHOUSE	0.64	LB/H	99	
WI-0236	THYSSEN KRUPP PLANT #4	MATERIAL HANDLING, CHARGE BAY	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	CLEANING AND GRINDING OF CASTINGS	81.49			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	CLEANING AND GRINDING OF CASTINGS	81.49			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	CLEANING AND GRINDING OF CASTINGS	81.49			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	SHOT BLAST	81.49			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U

*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0236	THYSSEN KRUPP PLANT #4	MATERIAL HANDLING, CHARGE BAY	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	CLEANING AND GRINDING OF CASTINGS	81.49			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	SHOT BLAST	81.49			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E portion of charge handling operations	0.022	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E portion of charge handling operations	0.022	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E portion of charge handling operations	0.022	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E portion of charge handling operations	0.022	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E portion of charge handling operations	0.022	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Each engine is a certified engine with associated required controls.	0.216	LB/H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Each engine is a certified engine with associated required controls.	0.216	LB/H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Each engine is a certified engine with associated required controls.	0.216	LB/H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Each engine is a certified engine with associated required controls.	0.216	LB/H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Each engine is a certified engine with associated required controls.	0.216	LB/H	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-8)	0.42	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-8)	0.42	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-8)	0.42	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-8)	0.42	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-8)	0.42	LB/H	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.6	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.6	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.6	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.6	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.6	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.6	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.6	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.6	LB/HR	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-12)	0.84	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-12)	0.84	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-12)	0.84	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-12)	0.84	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-12)	0.84	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	1	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	1	LB/H	0	

IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	1	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	1	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	1	LB/H	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.84	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.84	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.84	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.84	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.84	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.84	LB/HR	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	AUTOMATED MOLD COOLING CONVEYOR SYSTEM AND SHAKEOUT LINES	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 61,200 ACFM BAGHOUSE.	2.47	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	AUTOMATED MOLD COOLING CONVEYOR SYSTEM AND SHAKEOUT LINES	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 61,200 ACFM BAGHOUSE.	2.47	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	AUTOMATED MOLD COOLING CONVEYOR SYSTEM AND SHAKEOUT LINES	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 61,200 ACFM BAGHOUSE.	2.47	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	CASTING COOLING AND SHOT BLAST MACHINE (EU-CCFBACK)	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 65,360 ACFM BAGHOUSE.	2.64	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	CASTING COOLING AND SHOT BLAST MACHINE (EU-CCFBACK)	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 65,360 ACFM BAGHOUSE.	2.64	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	CASTING COOLING AND SHOT BLAST MACHINE (EU-CCFBACK)	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 65,360 ACFM BAGHOUSE.	2.64	LB/H	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	4.27	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	4.27	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	4.27	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	4.27	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	4.27	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	4.27	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	4.27	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	4.27	LB/HR	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 10 µ (TPM10)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, filterable (FPM)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 10 µ (TPM10)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, filterable (FPM)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 10 µ (TPM10)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, filterable (FPM)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 10 µ (TPM10)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, filterable (FPM)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 10 µ (TPM10)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, filterable (FPM)	N		7.6	LB/MMSCF	0	N

Table 5-6. BACT Determinations - Particulate Matter

Emission Unit	Description	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$	BACT Justification
EU01	Charge Handling	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	For this process there is no RBLC determination less than the proposed BACT for an APCD/stack that contains a source of significant condensable PM emissions. One RBLC entry for charge handling operation [RBLC ID MI-429] identified an outlet loading of 0.001 gr/dscf but the units routed to the stack (shotblasting, grinding and waste sand handling) do not have condensable particulates. For this emissions unit Method 5 was used to determine compliance.
EU07	Induction Furnace #1	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	For this process there is no RBLC determination less than the proposed BACT. For electric induction furnaces, there is one RLBC entry at 0.002 gr/dscf [RBLC ID MI-0429] and one RBLC entry of 0.003 gr/dscf [IN-0147].
EU08	Induction Furnace #2	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	For this process there is no RBLC determination less than the proposed BACT. For electric induction furnaces, there is one RLBC entry at 0.002 gr/dscf [RBLC ID MI-0429] and one RBLC entry of 0.003 gr/dscf [IN-0147].
EU09	Induction Furnace #3	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	For this process there is no RBLC determination less than the proposed BACT. For electric induction furnaces, there is one RLBC entry at 0.002 gr/dscf [RBLC ID MI-0429] and one RBLC entry of 0.003 gr/dscf [IN-0147].
EU10	Induction Furnace #4	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	For this process there is no RBLC determination less than the proposed BACT. For electric induction furnaces, there is one RLBC entry at 0.002 gr/dscf [RBLC ID MI-0429] and one RBLC entry of 0.003 gr/dscf [IN-0147].
EU13	Hot Metal Transfer	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Hot Metal Transfer at 0.002 gr/dscf [RBLC ID MI-0429].
EU17	Melt Baghouse Waste Dust Silo	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	For this process there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].
EU19	Mold Silica Sand Silo	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	For this process there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].
EU20	Blend Silo	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	For this process there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].
EU21	Bentonite Silo	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	For this process, there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].
EU22	Mold Sand Handling and Preparation	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Process ID 81.440 at 0.002 gr/dscf [RBLC ID MI-0429], one RBLC entry at 0.003 gr/dscf [IN-0147] and multiple entries at 0.005 gr/dscf [WI-0236 and WI-0238].
EU33	Mold Making #1	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Process ID 81.440 at 0.002 gr/dscf [RBLC ID MI-0429], one RBLC entry at 0.003 gr/dscf [IN-0147] and multiple entries at 0.005 gr/dscf [WI-0236 and WI-0238].
EU34	Mold Making #2	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Process ID 81.440 at 0.002 gr/dscf [RBLC ID MI-0429], one RBLC entry at 0.003 gr/dscf [IN-0147] and multiple entries at 0.005 gr/dscf [WI-0236 and WI-0238].
EU35A	Core Silica Sand Silo A	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	For this process there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].

EU35B	Core Silica Sand Silo B	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	For this process there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].
EU36	Core Sand Handling and Preparation	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Process ID 81.440 at 0.002 gr/dscf [RBLC ID MI-0429], one RBLC entry at 0.003 gr/dscf [IN-0147] and multiple entries at 0.005 gr/dscf [WI-0236 and WI-0238].
EU39	PUCB Core Machine #1	0.0005 gr/dscf 0.065 lb/hr 0.283 ton/yr	0.0005 gr/dscf 0.065 lb/hr 0.283 ton/yr	0.0005 gr/dscf 0.065 lb/hr 0.283 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There was one entry at 0.002 gr/dscf [MI-0429]. Emissions are not distinguishable in the RBLC between core sand handling (e.g. conveying, mixing) and generation of fugitive emissions during purging of catalyst.
EU40	PUCB Core Machine #2	0.0005 gr/dscf 0.065 lb/hr 0.283 ton/yr	0.0005 gr/dscf 0.065 lb/hr 0.283 ton/yr	0.0005 gr/dscf 0.065 lb/hr 0.283 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There was one entry at 0.002 gr/dscf [MI-0429]. Emissions are not distinguishable in the RBLC between core sand handling (e.g. conveying, mixing) and generation of fugitive emissions during purging of catalyst.
EU41	PUCB Core Machine #3	0.0005 gr/dscf 0.065 lb/hr 0.283 ton/yr	0.0005 gr/dscf 0.065 lb/hr 0.283 ton/yr	0.0005 gr/dscf 0.065 lb/hr 0.283 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There was one entry at 0.002 gr/dscf [MI-0429]. Emissions are not distinguishable in the RBLC between core sand handling (e.g. conveying, mixing) and generation of fugitive emissions during purging of catalyst.
EU42	PUCB Core Machine #4	0.0005 gr/dscf 0.065 lb/hr 0.283 ton/yr	0.0005 gr/dscf 0.065 lb/hr 0.283 ton/yr	0.0005 gr/dscf 0.065 lb/hr 0.283 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There was one entry at 0.002 gr/dscf [MI-0429]. Emissions are not distinguishable in the RBLC between core sand handling (e.g. conveying, mixing) and generation of fugitive emissions during purging of catalyst.
EU50	Pouring #1	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Process ID 81.450 at 0.002 gr/dscf [RBLC ID MI-0429], one RBLC entry at 0.0045 gr/dscf [WI-0256], and multiple entries at 0.005 gr/dscf [IN-0147, WI-0238, WI-0288, WI-0236 and WI-0238].
EU51	Pouring #2	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Process ID 81.450 at 0.002 gr/dscf [RBLC ID MI-0429], one RBLC entry at 0.0045 gr/dscf [WI-0256], and multiple entries at 0.005 gr/dscf [IN-0147, WI-0238, WI-0288, WI-0236 and WI-0238].
EU52	Mold Cooling	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Process ID 81.450 at 0.002 gr/dscf [RBLC ID MI-0429], one RBLC entry at 0.0045 gr/dscf [WI-0256], and multiple entries at 0.005 gr/dscf [IN-0147, WI-0288, WI-0236 and WI-0238].
EU53	Shakeout Conveyor	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	For this process there is one RBLC determination less than the proposed BACT. Once facility [MI-0429], exhausts shakeout emissions to three different baghouses [C, D and E]. Baghouse C has an emisison limit of 0.0015 gr/dscf while Baghouses D and E have emisison rates of 0.002 gr/dscf. It is impossible to determine which of these three baghouses see the bulk of the condensable particulate emissions. Several other RBLC entries have emissions exceeding the proposed BACT including RBLC ID IN-0147 (0.003 gr/dscf), WI-0256 (0.0045 gr/dscf), WI-0239 (0.005 gr/dscf), WI-0238 (0.005 gr/dscf) and WI-0288 (0.005 gr/dscf),
EU57	Sand Plant Waste Sand Silo	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	For this process there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].
EU59	Casting Cooling	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains several entries above the proposed BACT including 0.003 gr/dscf [RBLC ID IN-0147], 0.0045 gr/dscf [RBLC ID WI-0256], and 0.005 gr/dscf [RBLC ID WI-0239, WI-0288].
EU60	Sorting Conveyor	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains several entries above the proposed BACT including 0.003 gr/dscf [RBLC ID IN-0147] and multiple entries of 0.005 gr/dscf [RBLC WI-0288].
EU61	Steel Shot Blasting #1	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains an entry equivalent to the proposed BACT [MI-0429] and several entries above the proposed BACT including 0.003 gr/dscf [RBLC ID IN-0147] and multiple entries of 0.005 gr/dscf [RBLC WI-0238, WI-0239, and WI-0288].

EU62	Steel Shot Blasting #2	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains an entry equivalent to the proposed BACT [MI-0429] and several entries above the proposed BACT including 0.003 gr/dscf [RBLC ID IN-0147] and multiple entries of 0.005 gr/dscf [RBLC WI-0238, WI-0239, and WI-0288].
EU63	Fettling Baghouse Waste Dust Silo	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	For this process, there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].
EU64	Auto Grinding #1	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains an entry equivalent to the proposed BACT [MI-0429] and multiple entries of 0.005 gr/dscf [RBLC WI-0238 and WI-0288].
EU65	Auto Grinding #2	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains an entry equivalent to the proposed BACT [MI-0429] and multiple entries of 0.005 gr/dscf [RBLC WI-0238 and WI-0288].
EU66	Machining Lines (9)	0.0015 gr/dscf 0.259 lb/hr 1.133 ton/yr	0.0015 gr/dscf 0.259 lb/hr 1.133 ton/yr	0.0015 gr/dscf 0.259 lb/hr 1.133 ton/yr	There are no entries for this type of operation in the RBLC. Similar operations with larger baghouse are identified in the RBLC at 0.001 gr/dscf [MI-0429] and multiple entries of 0.005 gr/dscf [RBLC WI-0238 and WI-0288].
EU67	Perforation Lines (1)	0.0015 gr/dscf 0.259 lb/hr 1.133 ton/yr	0.0015 gr/dscf 0.259 lb/hr 1.133 ton/yr	0.0015 gr/dscf 0.259 lb/hr 1.133 ton/yr	There are no entries for this type of operation in the RBLC. Similar operations with larger baghouse are identified in the RBLC at 0.001 gr/dscf [MI-0429] and multiple entries of 0.005 gr/dscf [RBLC WI-0238 and WI-0288].
EU68	Paint Line #3	0.001 gr/dscf 0.023 lb/hr 0.101 ton/yr	0.001 gr/dscf 0.023 lb/hr 0.101 ton/yr	0.001 gr/dscf 0.023 lb/hr 0.101 ton/yr	For this process there were no RBLC determination under either iron and/or steel foundries. For miscellaneous metal parts and products [process id 81.44] only the FWNA was identified.
EU69	Paint Line #2	0.001 gr/dscf 0.023 lb/hr 0.101 ton/yr	0.001 gr/dscf 0.023 lb/hr 0.101 ton/yr	0.001 gr/dscf 0.023 lb/hr 0.101 ton/yr	For this process there were no RBLC determination under either iron and/or steel foundries. For miscellaneous metal parts and products [process id 81.44] only the FWNA was identified.
EU71	Paint Line #1	0.0015 gr/dscf 0.259 lb/hr 1.133 ton/yr	0.0015 gr/dscf 0.259 lb/hr 1.133 ton/yr	0.0015 gr/dscf 0.259 lb/hr 1.133 ton/yr	For this process there were no RBLC determination under either iron and/or steel foundries. For miscellaneous metal parts and products [process id 81.44] only the FWNA was identified.
EU77	Snag Grinder #1	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains an entry equivalent to the proposed BACT [MI-0429] and multiple entries of 0.005 gr/dscf [RBLC WI-0238 and WI-0288].
EU78	Snag Grinder #2	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains an entry equivalent to the proposed BACT [MI-0429] and multiple entries of 0.005 gr/dscf [RBLC WI-0238 and WI-0288].

Table 5-7. Units Emitting Carbon Monoxide

Emission Unit	Description
EU05	Refractory Burner #1
EU06	Refractory Burner #2
EU07	Induction Furnace #1
EU08	Induction Furnace #2
EU09	Induction Furnace #3
EU10	Induction Furnace #4
EU15	Pouring Furnace #1
EU16	Pouring Furnace #2
EU18	Refractory Curing Mobile Burner
EU44	Core Dryer #1
EU45	Core Dryer #2
EU46	Core Dryer #3
EU47	Core Dryer #4
EU50	Pouring #1
EU51	Pouring #2
EU52	Mold Cooling
EU53	Shakeout Conveyor
EU72	Emergency Generator #1
EU73	Emergency Generator #2
EU74	Emergency Generator #3

Table 5-8. Carbon Monoxide - RBLC Determinations

RBLCID	FACILITY NAME	PROCESS NAME	PROCESS TYPE	THRUPUT	THRUPUT UNITS	POLLUTANT	CONTROL METHOD CODE	CONTROL METHOD DESCRIPTION	EMISSION LIMIT 1	EMISSION LIMIT 1 UNIT	PERCENT EFFICIENCY	COMPLIANCE VERIFIED
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Carbon Monoxide	N		1	LB/T	0	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Carbon Monoxide	N		1	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Carbon Monoxide	N		1	LB/T	0	U
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	SHAKEOUT	81.46			Carbon Monoxide	N		1	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Carbon Monoxide	N		1	LB/T	0	U
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	SHAKEOUT	81.46			Carbon Monoxide	N		1	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
IN-0188	WAUPACA FOUNDRY, INC PLANT 5	LINE 4 POURING/MOLD COOLING AND SHAKEOUT	81.46	40	T/H	Carbon Monoxide	P	CONTROLLED BY A MOLD VENT OFF GAS IGNITION	6	LB/T OF IRON	0	
IN-0188	WAUPACA FOUNDRY, INC PLANT 5	LINE 4 POURING/MOLD COOLING AND SHAKEOUT	81.46	40	T/H	Carbon Monoxide	P	CONTROLLED BY A MOLD VENT OFF GAS IGNITION	6	LB/T OF IRON	0	
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Carbon Monoxide	N		44.57	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Carbon Monoxide	N		44.57	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Carbon Monoxide	N		44.57	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Carbon Monoxide	N		44.57	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Carbon Monoxide	N		44.57	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Carbon Monoxide	N		44.57	LB/H	0	N
OK-0141	ARDMORE FOUNDRY	Shake Out	81.46	736	TPY	Carbon Monoxide	N		227.5	LB/HR	0	N
OK-0141	ARDMORE FOUNDRY	Shake Out	81.46	736	TPY	Carbon Monoxide	N		227.5	LB/HR	0	N

Table 5-9. CO Control Technology Cost Effectiveness - Melt Baghouse (CU01/ST02)

Control Device ID Stack ID	Pollutant	Control Technology	Total Annualized Cost ($)	Pollutant Removed (tpy)	Cost Effectiveness ($/ton removed)
CU01 ST02	CO	Fixed Bed Catalytic Oxidizer	4,569,108	30.7	148,989.00
CU01 ST02	CO	Regenerative Thermal Oxidizer	2,341,564	30.7	76,354.00
CU01 ST02	CO VOC	Fixed Bed Catalytic Oxidizer	4,567,496	35.9	127,061.00
CU01 ST02	CO VOC	Regenerative Thermal Oxidizer	2,341,564	35.9	65,139.00

Table 5-10. CO Control Technology Cost Effectiveness - Sand Plant Baghouse (CU06/ST07)

Control Device ID Stack ID	Pollutant	Control Technology	Total Annualized Cost ($)	Pollutant Removed (tpy)	Cost Effectiveness ($/ton removed)
CU06 ST07	CO	Fixed Bed Catalytic Oxidizer	3,065,229	43.8	69,927.00
CU06 ST07	CO	Regenerative Thermal Oxidizer	1,539,366	43.8	35,118.00
CU06 ST07	CO VOC	Fixed Bed Catalytic Oxidizer	3,058,130	67.2	45,479.00
CU06 ST07	CO VOC	Regenerative Thermal Oxidizer	1,539,367	67.2	22,893.00

Table 5-11. CO Control Technology Cost Effectiveness - Core/Mold Baghouse (CU08/ST09)

Control Device ID Stack ID	Pollutant	Control Technology	Total Annualized Cost ($)	Pollutant Removed (tpy)	Cost Effectiveness ($/ton removed)
CU08 ST09	CO	Fixed Bed Catalytic Oxidizer	3,322,560	198.4	16,750.00
CU08 ST09	CO	Regenerative Thermal Oxidizer	1,669,610	198.4	8,417.00
CU08 ST09	CO VOC	Fixed Bed Catalytic Oxidizer	3,314,889	223.5	14,833.00
CU08 ST09	CO VOC	Regenerative Thermal Oxidizer	1,669,610	223.5	7,471.00

Table 5-12. BACT Determinations - Carbon Monoxide

Emission Unit	Description	BACT for CO	BACT Justification
EU07	Induction Furnace #1	0.5 lb/ton metal 5.0 lb/hr 5.724 ton/yr	For this process there is no RBLC determination less than the proposed BACT and their was no identification of an emission control device for carbon monoxide. There was one entry at 9.24 lb/hr [MI-0429] and another entry at 44.55 lb/hr [MI-0385]. The MI-0385 entry is for both melting and pouring and cannot be conditioned. It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU08	Induction Furnace #2	0.5 lb/ton metal 5.0 lb/hr 5.724 ton/yr	For this process there is no RBLC determination less than the proposed BACT and their was no identification of an emission control device for carbon monoxide. There was one entry at 9.24 lb/hr [MI-0429] and another entry at 44.55 lb/hr [MI-0385]. The MI-0385 entry is for both melting and pouring and cannot be conditioned. It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU09	Induction Furnace #3	0.5 lb/ton metal 5.0 lb/hr 5.724 ton/yr	For this process there is no RBLC determination less than the proposed BACT and their was no identification of an emission control device for carbon monoxide. There was one entry at 9.24 lb/hr [MI-0429] and another entry at 44.55 lb/hr [MI-0385]. The MI-0385 entry is for both melting and pouring and cannot be conditioned. It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU10	Induction Furnace #4	0.5 lb/ton metal 5.0 lb/hr 5.724 ton/yr	For this process there is no RBLC determination less than the proposed BACT and their was no identification of an emission control device for carbon monoxide. There was one entry at 9.24 lb/hr [MI-0429] and another entry at 44.55 lb/hr [MI-0385]. The MI-0385 entry is for both melting and pouring and cannot be conditioned. It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU50	Pouring #1	5 lb/ton metal 63.25 lb/hr 114.48 ton/yr	For this process there is no RBLC determination less than the proposed BACT and the only control method identified is "mold vent off gas ignition." There are three RBLC entries of 6 lb/ton [WI-0236 (under process 81.44), IN-0147) which appears likely for the addition of pouring, cooling and shakeout (PCS). There are equvalent emission limits of 5 lb/ton metal for several RBLC entries [RBLC ID WI-0238, WI-0256, WI-0288].
EU51	Pouring #2	5 lb/ton metal 63.25 lb/hr 114.48 ton/yr	For this process there is no RBLC determination less than the proposed BACT and the only control method identified is "mold vent off gas ignition." There are two RBLC entries of 6 lb/ton [WI-0236 (under process 81.44), IN-0147, IN-0188) which appears likely for the addition of pouring, cooling and shakeout (PCS). There are equvalent emission limits of 5 lb/ton metal for several RBLC entries [RBLC ID WI-0238, WI-0256, WI-0288].
EU52	Mold Cooling	See EU50 and EU51	See EU50 and EU51
EU53	Shakeout Conveyor	1 lb/ton metal 25.3 lb/hr 45.79 ton/yr	For this process there is no RBLC determination less than the proposed BACT and the only control method identified is "mold vent off gas ignition." There are two RBLC entries of 6 lb/ton [WI-0236 (under process 81.44), IN-0147, IN-0188) which appears likely for the addition of pouring, cooling and shakeout (PCS). There are equvalent emission limits of 1 lb/ton metal for several RBLC entries [RBLC ID WI-0238, WI-0239, WI-0256].

Table 5-13. Units Emitting Volatile Organic Compounds

Emission Unit	Description
EU05	Refractory Burner #1
EU06	Refractory Burner #2
EU07	Induction Furnace #1
EU08	Induction Furnace #2
EU09	Induction Furnace #3
EU10	Induction Furnace #4
EU15	Pouring Furnace #1
EU16	Pouring Furnace #2
EU18	Refractory Curing Mobile Burner
EU39	PUCB Core Machine #1
EU40	PUCB Core Machine #2
EU41	PUCB Core Machine #3
EU42	PUCB Core Machine #4
EU43	Core Wash Station #1
EU44	Core Dryer #1
EU45	Core Dryer #2
EU46	Core Dryer #3
EU47	Core Dryer #4
EU50	Pouring #1
EU51	Pouring #2
EU52	Mold Cooling
EU53	Shakeout Conveyor
EU68	Paint Line #3
EU69	Paint Line #2
EU71	Paint Line #1
EU72	Emergency Generator #1
EU73	Emergency Generator #2
EU74	Emergency Generator #3
EU75	Diesel Storage Tank
EU79	Core Wash Station #2
EU80	Core Wash Station #3
EU81	Core Wash Station #4
EU82	Rust Preventative Application

Table 5-14. Volatile Organic Compound - RBLC Determinations

RBLCID	FACILITY NAME	PROCESS NAME	PROCESS TYPE	THRUPUT	THRUPUT UNITS	POLLUTANT	CONTROL METHOD CODE	CONTROL METHOD DESCRIPTION	EMISSION LIMIT 1	EMISSION LIMIT 1 UNIT	PERCENT EFFICIENCY	COMPLIANCE VERIFIED
IN-0288	WAUPACA FOUNDRY, INC. PLANT 5	100 KW emergency generator	17.23	1.12	MMBTU/H	Volatile Organic Compounds (VOC)	N		0.36	LB/MMBTU	0	U
IN-0288	WAUPACA FOUNDRY, INC. PLANT 5	P51A, P54A, P51B, Hot Water Heater	19.6	33.65	MMBTU/H	Volatile Organic Compounds (VOC)	N		0.005	LB/MILLION FT3	0	U
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Volatile Organic Compounds (VOC)	A	RECUPERATIVE INCINERATOR	0.02	LB/T	0	U
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Volatile Organic Compounds (VOC)	A	RECUPERATIVE INCINERATOR	0.02	LB/T	0	U
IN-0136	THYSSENKRUPP WAPUPACA, INC.	GRAY IRON CUPOLAS	81.41	100	T/H EACH	Volatile Organic Compounds (VOC)	A	INCINERATOR	0.02	LB/T OF IRON	99	
IN-0136	THYSSENKRUPP WAPUPACA, INC.	GRAY IRON CUPOLAS	81.41	100	T/H EACH	Volatile Organic Compounds (VOC)	A	INCINERATOR	0.02	LB/T OF IRON	99	
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Volatile Organic Compounds (VOC)	A	RECUPERATIVE INCINERATOR	0.02	LB/T	0	U
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Volatile Organic Compounds (VOC)	A	RECUPERATIVE INCINERATOR	0.02	LB/T	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Volatile Organic Compounds (VOC)	N		0.84	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Volatile Organic Compounds (VOC)	N		0.84	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Volatile Organic Compounds (VOC)	N		0.84	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Volatile Organic Compounds (VOC)	N		0.84	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Volatile Organic Compounds (VOC)	N		0.84	LB/H	0	N
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MELTING AND POURING (EU-MP)	81.42	115500	T/YR	Volatile Organic Compounds (VOC)	N		5.28	LB/H	0	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MELTING AND POURING (EU-MP)	81.42	115500	T/YR	Volatile Organic Compounds (VOC)	N		5.28	LB/H	0	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MELTING AND POURING (EU-MP)	81.42	115500	T/YR	Volatile Organic Compounds (VOC)	N		5.28	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Volatile Organic Compounds (VOC)	N		0.28	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Volatile Organic Compounds (VOC)	N		0.28	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Volatile Organic Compounds (VOC)	N		0.28	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Volatile Organic Compounds (VOC)	N		0.28	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Volatile Organic Compounds (VOC)	N		0.28	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Volatile Organic Compounds (VOC)	N		0.28	LB/H	0	U
WI-0236	THYSSEN KRUPP PLANT #4	DISA LINES #4 & #5	81.44			Volatile Organic Compounds (VOC)	N		0.6	LB/T	0	U
WI-0236	THYSSEN KRUPP PLANT #4	DISA LINES #4 & #5	81.44			Volatile Organic Compounds (VOC)	N		0.6	LB/T	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGCORECHEM (Core Washing)	81.44	0		Volatile Organic Compounds (VOC)	N		1.43	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGCORECHEM (Core Washing)	81.44	0		Volatile Organic Compounds (VOC)	N		1.43	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGCORECHEM (Core Washing)	81.44	0		Volatile Organic Compounds (VOC)	N		1.43	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGCORECHEM (Core Washing)	81.44	0		Volatile Organic Compounds (VOC)	N		1.43	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGCORECHEM (Core Washing)	81.44	0		Volatile Organic Compounds (VOC)	N		1.43	LB/H	0	N
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MOLD MACHINE AND SAND HANDLING (EU-SS)	81.44			Volatile Organic Compounds (VOC)	N		4	LB/H	0	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MOLD MACHINE AND SAND HANDLING (EU-SS)	81.44			Volatile Organic Compounds (VOC)	N		4	LB/H	0	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MOLD MACHINE AND SAND HANDLING (EU-SS)	81.44			Volatile Organic Compounds (VOC)	N		4	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Volatile Organic Compounds (VOC)	N		1.83	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Volatile Organic Compounds (VOC)	N		1.83	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Volatile Organic Compounds (VOC)	N		1.83	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Volatile Organic Compounds (VOC)	N		1.83	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Volatile Organic Compounds (VOC)	N		1.83	LB/H	0	N
IN-0165	HARRISON STEEL CASTINGS COMPANY	AIRSET MOLD LINE ENCLOSED MOLD SAND MIXER	81.44	47.2	T/H OF SAND	Volatile Organic Compounds (VOC)	A	THERMAL SAND RECLAMATION SYSTEM, NO DESTRUCTION EFFICIENCY	2.2	LB/H	97.2	
IN-0165	HARRISON STEEL CASTINGS COMPANY	AIRSET MOLD LINE ENCLOSED MOLD SAND MIXER	81.44	47.2	T/H OF SAND	Volatile Organic Compounds (VOC)	A	THERMAL SAND RECLAMATION SYSTEM, NO DESTRUCTION EFFICIENCY	2.2	LB/H	97.2	
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Volatile Organic Compounds (VOC)	N		14.47	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Volatile Organic Compounds (VOC)	N		14.47	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Volatile Organic Compounds (VOC)	N		14.47	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Volatile Organic Compounds (VOC)	N		14.47	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Volatile Organic Compounds (VOC)	N		14.47	LB/H	0	N
IN-0136	THYSSENKRUPP WAPUPACA, INC.	CASTING LINES 1-8	81.45	200	T/H COMBINED	Volatile Organic Compounds (VOC)	N	MOLD VENT OFF GAS IGNITION	0		50	U
IN-0136	THYSSENKRUPP WAPUPACA, INC.	CASTING LINES 1-8	81.45	200	T/H COMBINED	Volatile Organic Compounds (VOC)	N	MOLD VENT OFF GAS IGNITION	0		50	U
WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Volatile Organic Compounds (VOC)	N		0.5	LB/T	0	U
WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Volatile Organic Compounds (VOC)	N		0.5	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.5	POUNDS/TON OF METAL	0	U

WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Volatile Organic Compounds (VOC)	N		0.5	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.5	POUNDS/TON OF METAL	0	U
WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Volatile Organic Compounds (VOC)	N		0.5	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.5	POUNDS/TON OF METAL	0	U
IN-0257	INTAT PRECISION, INC.	CASTING LINE 2	81.45	15	T/H OF METAL	Volatile Organic Compounds (VOC)	P	MOLD VENT OFF-GAS IGNITION SYSTEM	1.2	LB/T OF METAL	0	U
IN-0288	WAUPACA FOUNDRY, INC. PLANT 5	Casting Lines 1, 5, 7	81.45	43	T/H	Volatile Organic Compounds (VOC)	N		1.4	LB/TON	0	U
IA-0104	JOHN DEERE FOUNDRY WATERLOO	804 Sand System	81.45	61.33	T/H OF METAL	Volatile Organic Compounds (VOC)	N		8	PPMV	0	N
IA-0104	JOHN DEERE FOUNDRY WATERLOO	804 Sand System	81.45	61.33	T/H Metal	Volatile Organic Compounds (VOC)	N		8	PPMV	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL (pouring and cooling for both production lines)	81.45	0		Volatile Organic Compounds (VOC)	N		34.75	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL (pouring and cooling for both production lines)	81.45	0		Volatile Organic Compounds (VOC)	N		34.75	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL (pouring and cooling for both production lines)	81.45	0		Volatile Organic Compounds (VOC)	N		34.75	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL (pouring and cooling for both production lines)	81.45	0		Volatile Organic Compounds (VOC)	N		34.75	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL (pouring and cooling for both production lines)	81.45	0		Volatile Organic Compounds (VOC)	N		34.75	LB/H	0	N
IN-0165	HARRISON STEEL CASTINGS COMPANY	AIRSET MOLD LINE POURING AND CASTINGS COOLING OPERATIONS	81.45	15.73	T/H OF METAL	Volatile Organic Compounds (VOC)	N		1.8	LB/T METAL POURED	0	
IN-0165	HARRISON STEEL CASTINGS COMPANY	AIRSET MOLD LINE POURING AND CASTINGS COOLING OPERATIONS	81.45	15.73	T/H OF METAL	Volatile Organic Compounds (VOC)	N		1.8	LB/T METAL POURED	0	
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Volatile Organic Compounds (VOC)	N		0.1	LB/T	0	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Volatile Organic Compounds (VOC)	N		0.1	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.1	POUNDS/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.1	POUNDS/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.1	POUNDS/TON OF METAL	0	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Volatile Organic Compounds (VOC)	N		0.1	LB/T	0	U
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	SHAKEOUT	81.46			Volatile Organic Compounds (VOC)	N		0.1	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.1	POUNDS/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.1	POUNDS/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.1	POUNDS/TON OF METAL	0	U
IN-0188	WAUPACA FOUNDRY, INC PLANT 5	LINE 4 POURING/MOLD COOLING AND SHAKEOUT	81.46	40	T/H	Volatile Organic Compounds (VOC)	P	CONTROLLED BY A MOLD VENT OFF GAS IGNITION	1.4	LB/T OF IRON	0	
IN-0188	WAUPACA FOUNDRY, INC PLANT 5	LINE 4 POURING/MOLD COOLING AND SHAKEOUT	81.46	40	T/H	Volatile Organic Compounds (VOC)	P	CONTROLLED BY A MOLD VENT OFF GAS IGNITION	1.4	LB/T OF IRON	0	
IN-0143	THYSSENKRUPP WAUPACA, INC. PLANT 5	CASTING LINES(1-4)	81.46	0		Volatile Organic Compounds (VOC)	N		1.9	LB/T OF IRON*	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Volatile Organic Compounds (VOC)	N		14.78	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Volatile Organic Compounds (VOC)	N		14.78	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Volatile Organic Compounds (VOC)	N		14.78	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Volatile Organic Compounds (VOC)	N		14.78	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Volatile Organic Compounds (VOC)	N		14.78	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Volatile Organic Compounds (VOC)	A	Each engine is a certified engine with associated required controls.	1	G/HP-H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Volatile Organic Compounds (VOC)	A	Each engine is a certified engine with associated required controls.	1	G/HP-H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Volatile Organic Compounds (VOC)	A	Each engine is a certified engine with associated required controls.	1	G/HP-H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Volatile Organic Compounds (VOC)	A	Each engine is a certified engine with associated required controls.	1	G/HP-H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Volatile Organic Compounds (VOC)	A	Each engine is a certified engine with associated required controls.	1	G/HP-H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Volatile Organic Compounds (VOC)	N		5.5	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Volatile Organic Compounds (VOC)	N		5.5	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDIPTANK	81.49	0		Volatile Organic Compounds (VOC)	N		15.2	T/YR	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDIPTANK	81.49	0		Volatile Organic Compounds (VOC)	N		15.2	T/YR	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDIPTANK	81.49	0		Volatile Organic Compounds (VOC)	N		15.2	T/YR	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDIPTANK	81.49	0		Volatile Organic Compounds (VOC)	N		15.2	T/YR	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDIPTANK	81.49	0		Volatile Organic Compounds (VOC)	N		15.2	T/YR	0	N

MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Volatile Organic Compounds (VOC)	N		5.5	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Volatile Organic Compounds (VOC)	N		5.5	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Volatile Organic Compounds (VOC)	N		5.5	LB/MMSCF	0	N
IA-0104	JOHN DEERE FOUNDRY WATERLOO	Cooling Shed	81.49	61.33	T/H OF METAL	Volatile Organic Compounds (VOC)	N		8	PPMV	0	N
IA-0104	JOHN DEERE FOUNDRY WATERLOO	Cooling Shed	81.49	61.33	T/H Metal	Volatile Organic Compounds (VOC)	N		8	PPMV	0	N
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	AUTOMATED MOLD COOLING CONVEYOR SYSTEM AND SHAKEOUT LINES	81.49			Volatile Organic Compounds (VOC)	N		15.49	LB/H	0	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	AUTOMATED MOLD COOLING CONVEYOR SYSTEM AND SHAKEOUT LINES	81.49			Volatile Organic Compounds (VOC)	N		15.49	LB/H	0	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	AUTOMATED MOLD COOLING CONVEYOR SYSTEM AND SHAKEOUT LINES	81.49			Volatile Organic Compounds (VOC)	N		15.49	LB/H	0	U
IN-0227	METAL TECHNOLOGIES AUBURN, LLC	NATURAL GAS-FIRED THERMAL CHIP DRYER	81.49	15	T/H METAL CHIPS	Volatile Organic Compounds (VOC)	A	THERMAL OXIDIZER	98	% OVERALL CONTROL	98	

Table 5-15. VOC Control Technology Cost Effectiveness - Melt Baghouse (CU01/ST02)

Control Device ID Stack ID	Pollutant	Control Technology	Total Annualized Cost ($)	Pollutant Removed (tpy)	Cost Effectiveness ($/ton removed)
CU01 ST02	VOC	Fixed Bed Catalytic Oxidizer	4,569,519	5.3	865,464.00
CU01 ST02	VOC	Regenerative Thermal Oxidizer	2,341,564	5.3	443,491.00
CU01 ST02	CO VOC	Fixed Bed Catalytic Oxidizer	4,567,496	35.9	127,061.00
CU01 ST02	CO VOC	Regenerative Thermal Oxidizer	2,341,564	35.9	65,139.00

Table 5-16. VOC Control Technology Cost Effectiveness - Sand Plant Baghouse (CU06/ST07)

Control Device ID Stack ID	Pollutant	Control Technology	Total Annualized Cost ($)	Pollutant Removed (tpy)	Cost Effectiveness ($/ton removed)
CU06 ST07	VOC	Fixed Bed Catalytic Oxidizer	3,061,083	23.1	132,796.00
CU06 ST07	VOC	Regenerative Thermal Oxidizer	1,539,367	23.1	66,781.00
CU06 ST07	CO VOC	Fixed Bed Catalytic Oxidizer	3,058,130	67.2	45,479.00
CU06 ST07	CO VOC	Regenerative Thermal Oxidizer	1,539,367	67.2	22,893.00

Table 5-17. VOC Control Technology Cost Effectiveness - Core/Mold Baghouse (CU08/ST09)

Control Device ID Stack ID	Pollutant	Control Technology	Total Annualized Cost ($)	Pollutant Removed (tpy)	Cost Effectiveness ($/ton removed)
CU08 ST09	VOC	Fixed Bed Catalytic Oxidizer	3,327,975	25.1	132,458.00
CU08 ST09	VOC	Regenerative Thermal Oxidizer	1,669,610	25.1	66,453.00
CU08 ST09	CO VOC	Fixed Bed Catalytic Oxidizer	3,314,889	223.5	14,833.00
CU08 ST09	CO VOC	Regenerative Thermal Oxidizer	1,669,610	223.5	7,471.00

Table 5-18. VOC Control Technology Cost Effectiveness - Acid Scrubber (CU07/ST08)

Control Device ID Stack ID	Pollutant	Control Technology	Total Annualized Cost ($)	Pollutant Removed (tpy)	Cost Effectiveness ($/ton removed)
CU07 ST08	VOC	Fixed Bed Catalytic Oxidizer	3,327,975	33.2	132,458.00
CU07 ST08	VOC	Regenerative Thermal Oxidizer	1,669,610	33.2	66,453.00
CU07 ST08	VOC	Recuperative Thermal Oxidizer	3,314,889	33.2	14,833.00

Table 5-19. VOC Control Technology Cost Effectiveness - Paint Line Operations

Emission Unit ID	Emission Unit Description	Control Technology	Uncontrolled Emission Rate (tpy)[1]	DRE (%)	Total Annualized Cost ($)	Pollutants Removed (tpy)	Cost Effectiveness ($/ton removed)
EU68 EU69 EU71	Paint Line #3 Paint Line #2 Paint Line #1	Biofilter	26	62	433,073.00	10.00	43,307.30
EU68 EU69 EU71	Paint Line #3 Paint Line #2 Paint Line #1	Activated Carbon with Regeneration	26	90	686,964.00	14.5	47,376.83
EU68 EU69 EU71	Paint Line #3 Paint Line #2 Paint Line #1	Regenerative Thermal Oxidizer	26	95	363,845.00	15.3	23,788

[1]Uncontrolled emission rate from previously 2017 permit revision and represents conservative cost-effectiveness (CY2022 permit revision VOC PTE is 21.1)

Table 5-20. Alternate Facility VOC and PM Control Technologies - Paint Line Operations

Foundry	Location	Uncontrolled VOC Emission Rate (tpy)	VOC Control Technology	PM Control Technology
NIBCO	Blytheville, AR	31	None	Fabric Filter
Asama	Coldwater, MI	30	None	Fabric Filter
Brembo	Homer, MI	43.5	None	Fabric Filter

Table 5-21. BACT Determinations - Volatile Organic Compounds

Emission Unit	Description	BACT for CO	BACT Justification
EU07	Induction Furnace #1	0.09 lb/ton metal 0.93 lb/hr 1.065 ton/yr	The RBLC contains no identified of emission control for this process. Two RBLC determinations are less than the proposed BACT. This first emission rate is 0.84 lb/hr [MI-0429]) and another entry has an emission rate exceeding the proposed BACT but is for both melting and pouring operations (5.28 lb/hr [MI-0385]). It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU08	Induction Furnace #2	0.09 lb/ton metal 0.93 lb/hr 1.065 ton/yr	The RBLC contains no identified of emission control for this process. Two RBLC determinations are less than the proposed BACT. This first emission rate is 0.84 lb/hr [MI-0429]) and another entry has an emission rate exceeding the proposed BACT but is for both melting and pouring operations (5.28 lb/hr [MI-0385]). It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU09	Induction Furnace #3	0.09 lb/ton metal 0.93 lb/hr 1.065 ton/yr	The RBLC contains no identified of emission control for this process. Two RBLC determinations are less than the proposed BACT. This first emission rate is 0.84 lb/hr [MI-0429]) and another entry has an emission rate exceeding the proposed BACT but is for both melting and pouring operations (5.28 lb/hr [MI-0385]). It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU10	Induction Furnace #4	0.09 lb/ton metal 0.93 lb/hr 1.065 ton/yr	The RBLC contains no identified of emission control for this process. Two RBLC determinations are less than the proposed BACT. This first emission rate is 0.84 lb/hr [MI-0429]) and another entry has an emission rate exceeding the proposed BACT but is for both melting and pouring operations (5.28 lb/hr [MI-0385]). It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU39	PUCB Core Machine #1	4.556 lb/hr 8.327 ton/yr	For this process there is no RBLC determination less than the proposed BACT and no control method identified. Emissions are going to be dependent on binder technology used. It appears only the entries for MI-0429 is using a similar binder technology and has an emission rate of 14.47 lb/hr.
EU40	PUCB Core Machine #2	4.556 lb/hr 8.327 ton/yr	For this process there is no RBLC determination less than the proposed BACT and no control method identified. Emissions are going to be dependent on binder technology used. It appears only the entries for MI-0429 is using a similar binder technology and has an emission rate of 14.47 lb/hr.
EU41	PUCB Core Machine #3	4.556 lb/hr 8.327 ton/yr	For this process there is no RBLC determination less than the proposed BACT and no control method identified. Emissions are going to be dependent on binder technology used. It appears only the entries for MI-0429 is using a similar binder technology and has an emission rate of 14.47 lb/hr.
EU42	PUCB Core Machine #4	4.556 lb/hr 8.327 ton/yr	For this process there is no RBLC determination less than the proposed BACT and no control method identified. Emissions are going to be dependent on binder technology used. It appears only the entries for MI-0429 is using a similar binder technology and has an emission rate of 14.47 lb/hr.
EU43	Core Wash Station #1	5.130 lb/hr 1.026 ton/yr	For this process there is no RBLC determination less than the proposed BACT and no control method identified. Emissions are going to be dependent on binder technology used. It appears only the entries for MI-0429 is using a similar binder technology and has an emission rate of 1.43 lb/hr.
EU50	Pouring #1	0.5 lb/ton metal 6.325 lb/hr 11.448 ton/yr	For this process there is no RBLC determination less than the proposed BACT and the only control method identified is "mold vent off gas ignition." There are two RBLC entries of 0.5 lb/ton metal [WI-0238, WI-0256) and 1.8 lb/ton metal which is a chemically bonded mold [IN-0165]. In addition there are two entries for a total emission rate of 1.2 blt/on [IN-0257] and 1.4 lb/ton [IN-0288]. The equivalent emission rate for FWNA is 1.028 lb/ton metal which is less than both of these values.
EU51	Pouring #2	0.5 lb/ton metal 6.325 lb/hr 11.448 ton/yr	For this process there is no RBLC determination less than the proposed BACT and the only control method identified is "mold vent off gas ignition." There are two RBLC entries of 0.5 lb/ton metal [WI-0238, WI-0256) and 1.8 lb/ton metal which is a chemically bonded mold [IN-0165]. In addition there are two entries for a total emission rate of 1.2 blt/on [IN-0257] and 1.4 lb/ton [IN-0288]. The equivalent emission rate for FWNA is 1.028 lb/ton metal which is less than both of these values.

EU52	Mold Cooling	See EU50 and EU51	See EU50 and EU51
EU53	Shakeout Conveyor	0.528 lb/ton metal 13.358 lb/hr 24.179 ton/yr	For this process there is one RBLC determination less than the proposed BACT and the only control method identified is "mold vent off gas ignition." WI-0238 and WI-0256 have emission rates of 0.1 lb/ton metal. RBLC lists the compliance demonstration as unknown. The facility has been contacted and verified that they cannot meet this emission rate. In addition there are four entries for a total emission rate of 1.2 blt/on [IN-0257], 1.4 lb/ton [IN-0288], 1.4 lb/ton metal [IN-0188] and 1.9 lb/ton metal. The equivalent emission rate for FWNA is 1.028 lb/ton metal which is less than all four of these values.
EU68	Paint Line #3	2.218 lb/hr 9.713 ton/yr	For this process, there were no RBLC determination under either iron and/or steel foundries. For miscellaneous metal parts and products [process id 81.44] only the FWNA was identified. Cost effectiveness analysis supports the identified emission rates as BACT.
EU69	Paint Line #2	2.218 lb/hr 9.713 ton/yr	For this process, there were no RBLC determination under either iron and/or steel foundries. For miscellaneous metal parts and products [process id 81.44] only the FWNA was identified. Cost effectiveness analysis supports the identified emission rates as BACT.
EU71	Paint Line #1	0.513 lb/hr 2.244 ton/yr	For this process, there were no RBLC determination under either iron and/or steel foundries. For miscellaneous metal parts and products [process id 81.44] only the FWNA was identified. Cost effectiveness analysis supports the identified emission rates as BACT.
EU75	Diesel Storage Tank	0.918 lb/hr 0.069 ton/yr	The diesel storage tank shall be equipped with a permanent submerged fill pipe.
EU79	Core Wash Station #2	5.130 lb/hr 1.026 ton/yr	For this process there is no RBLC determination less than the proposed BACT and no control method identified. Emissions are going to be dependent on binder technology used. It appears only the entries for MI-0429 is using a similar binder technology and has an emission rate of 1.43 lb/hr.
EU80	Core Wash Station #3	5.130 lb/hr 1.026 ton/yr	For this process there is no RBLC determination less than the proposed BACT and no control method identified. Emissions are going to be dependent on binder technology used. It appears only the entries for MI-0429 is using a similar binder technology and has an emission rate of 1.43 lb/hr.
EU81	Core Wash Station #4	5.130 lb/hr 1.026 ton/yr	For this process there is no RBLC determination less than the proposed BACT and no control method identified. Emissions are going to be dependent on binder technology used. It appears only the entries for MI-0429 is using a similar binder technology and has an emission rate of 1.43 lb/hr.
EU82	Rust Preventative Application	2.500 lb/hr 1.000 ton/yr	For this process, there were no RBLC determination under either iron and/or steel foundries. For miscellaneous metal parts and products [process id 81.44] only the FWNA was identified. Emission rate could be supported by cost-effectiveness analysis.

Table 6-1. SMC, SIL, NAAQS and Increment Concentrations

Pollutant	Averaging Period	Significant Monitoring Concentration[a,k] ($\mu g/m^3$)	Class II SIL[e,g,k] ($\mu g/m^3$)	Primary NAAQS ($\mu g/m3$)	PSD Class II Increment[f] ($\mu g/m^3$)
PM_{10}	24-hour	10	5	150[b]	30[j]
	Annual	NA	1	Revoked[c]	17[k]
$PM_{2.5}$	24-hour	4[d]	1.2	35[h]	9[j]
	Annual	NA	0.2	12[i]	4[k]
CO[f]	1-hour	NA	2000	40000[j] (35 ppm)	-
	8-hour	575	500	10000[j] (9 ppm)	-

[a]401 KAR 51:017 Section 7(5)(a) and 40 CFR 52.21(i)(5)(i). See footnote d.

[b]Not to be exceeded more than three times in three consecutive years (H6H for all 5 years modeled together).

[c]Primary and secondary annual PM10 NAAQS of 50 µg/m3 was revoked effective 12/18/2006 [71 FR 6114].

[d]$PM_{2.5}$ SMC determined not authorized by CAA (court decision June 23, 2016), but EPA retains the argument that value can be used as part of an overall monitoring assessment.

[e]401 KAR 51:017 Section 9(2). See footnote g.

[f]401 KAR 51:017 Section 2(1).

[g]USEPA document "Guidance on SIL for Ozone and Fine Particles in PSD Permitting Program" (4/17/2018) identifies annual $PM_{2.5}$ Class II SIL value of 0.2 $\mu g/m^3$.

[h]3-year average of the 98th percentile 24-hour average concentration (H8H for each 1-year, 5 separate model runs are averaged together).

[i]3-year average of the annual arithmetic average concetnrations (H1H for each 1-year, 5 spearate model runs are averaged together).

[j]The maximum of the second highest 1-year concentration, 5 separate runs, maximum of the H2H concentrations.

[k]Single highest concentration during the 5-year modeling period.

Table 6-2. FWNA Air Dispersion Modeling Parameters

Stack ID	X Coord (m)	Y Coord (m)	$PM_{10}/PM_{2.5}$ Emission Rate (lb/hr)	CO Emission Rate (lb/hr)	Stack Height		Stack Diameter		Stack Temperature		Stack Velocity		Air Volume (cfm)	Stack Orientation
					(m)	(ft)	(m)	(ft)	(°K)	(°F)	(m/s)	(fps)		
ST02	539906	4072425	2.6431	22.04	35	114.8	2.54	8.33	305	90	14.9	48.9	160000	V
ST03	539903	4072413	0.0154	0.00	17	55.8	0.30	1.00	294	70	3.9	12.7	600	H
ST04	539904	4072404	0.0154	0.00	22	72.2	0.30	1.00	294	70	3.9	12.7	600	H
ST05	539906	4072407	0.0154	0.00	22	72.2	0.30	1.00	294	70	3.9	12.7	600	H
ST06	539908	4072411	0.0154	0.00	22	72.2	0.30	1.00	294	70	3.9	12.7	600	H
ST07	539888	4072396	2.2083	25.30	40	131.2	2.03	6.67	300	80	15.3	50.1	105000	V
ST08	539822	4072517	0.0643	0.00	26	85.3	0.97	3.17	294	70	9.7	31.7	15000	V
ST09	539816	4072488	1.8997	127.82	43	141.1	1.97	6.46	305	90	17.8	58.5	115000	V
ST11	539901	4072410	0.0154	0.00	17	55.8	0.30	1.00	294	70	3.9	12.7	600	H
ST12	539832	4072331	0.5734	0.00	30	98.4	1.52	5.00	286	55	16.8	55.2	65000	V
ST13	539899	4072407	0.0154	0.00	17	55.8	0.30	1.00	294	70	3.9	12.7	600	H
ST15A	539708	4072441	0.0230	0.00	14.2	46.6	0.41	1.33	301	82	10.1	33.0	2750	VO
ST15B	539704	4072435	0.0230	0.00	14.2	46.6	0.41	1.33	301	82	10.0	32.8	2750	VO
ST16	539698	4072424	0.3450	0.00	14.2	46.6	0.98	3.22	297	75	12.7	41.7	20310	V

Table 6-3. Results of SIL Modeling Analysis

Pollutant	Averaging Period	Resulting Concentration ($\mu g/m^3$)	Class II SIL ($\mu g/m^3$)	Exceed SIL (Y/N)?	Modeled Percentage of SIL (%)
PM_{10}	24-hour	8.44	5	Y	168.8%
	Annual	1.59	1	Y	159.0%
$PM_{2.5}$	24-hour	8.44	1.2	Y	703.3%
	Annual	1.59	0.2	Y	795.0%
CO[f]	1-hour	510.9	2000	N	25.5%
	8-hour	288.6	500	N	57.7%

Table 6-4. Results of SMC Modeling Analysis

Pollutant	Averaging Period	Resulting Concentration (µg/m^3)	Significant Monitoring Concentration (µg/m^3)	Exceed SMC (Y/N)?	Modeled Percentage of SMC (%)
PM_{10}	24-hour	8.44	10	N	84.4%
	Annual	NA	NA	NA	NA
$PM_{2.5}$	24-hour	8.44	4	Y	211.0%
	Annual	NA	NA	NA	NA
CO[f]	1-hour	NA	NA	NA	NA
	8-hour	288.6	575	N	50.2%

Table 6-5. Background Concentrations for PM_{10} and $PM_{2.5}$ Air Quality Analysis

Pollutant	Averaging Period	Monitor Background Concentration ($\mu g/m^3$)	Metric	Monitor Location
PM_{10}	24-hour	35.67	3-year average of second-high	Lockeland Monitor (AQS Site ID 47-037-223) 105 South 17th Street Nashville, TN
$PM_{2.5}$	24-hour	16.77	3-year average of 98th percentile	Smiths Grove (AQS Site ID 227-0009) 226 Sunset Street Bowling Green, KY
	Annual	7.79	3-year arithmetic mean average	

Table 6-6. Offsite Sources of PM_{10} Emissions for Cumulative Modeling Analysis

Facility ID	AI ID	Facility Name	County	Subject Item Designation	Easting	Northing	24 hour Emission Rate (lb/day)	Stack Diameter (ft)	Stack Height (ft)	Stack Flow Rate (cfm)	Stack Velocity (ft/sec)	Temp (F)	Construction Date	Emissions Document	Elevation (m)
2121300032	39901	Brite Metals Inc	Simpson	BRMI	538406	4070474	0.1395	1.0	13	9994	212.08	120	11/01/1985	2019 Emissions Survey	204.22
2121300018	39912	Perdue AgriBusiness LLC	Simpson	004	537901	4064299	5.2669	1.0	100	707	15.00	77	09/01/1973	2019 Emissions Survey	214.27
2121300051	82781	Vermont Thread Gage LLC	Simpson	VTG	539633	4072205	0.0123	1.2	17	1961	30.40	78	01/01/2007	2019 Emissions Survey	203.30
2121300059	107116	RKW North America Inc	Simpson	RKW	539430	4071698	0.2709	1.0	15	707	15	300	04/19/2014	2019 Emissions Survey	204.22
2121300005	3974	Hanson Aggregates Midwest LLC - Franklin Quarry	Warren	HAFQ	539712	4074966	43.3006					68	12/20/2004	2019 Emissions Survey	

Table 6-7. Offsite Sources of $PM_{2.5}$ Emissions for Cumulative Modeling Analysis

Facility ID	AI ID	Facility Name	County	Subject Item Designation	Easting	Northing	24-Hour Emission Rate (lb/day)	Annual Emission Rate (lb/yr)	Stack Diameter (ft)	Stack Height (ft)	Stack Flow Rate (cfm)	Stack Velocity (ft/sec)	Temp (F)	Elevation (m)
2121300005	3974	Hanson Aggregates Midwest LLC - Franklin Quarry	Warren	HAFQ	539712	4074966	25	9151					68.00	197.09
2121300032	39901	Brite Metals Inc	Simpson	BRMI	538406	4070474	0.01	3.8	1.0	13	9994	212.08	120	204.22
2121300059	107116	RKW North America Inc	Simpson	RKW	539430	4071698	0.12	44.5	1.0	15	707	15	300.00	204.22

Table 6-8. Results of PM_{10} and $PM_{2.5}$ NAAQS Analysis

Pollutant	Averaging Period	Primary NAAQS (µg/m3)	Background Concentration (µg/m^3)	Modeled Resulting Concentration (µg/m^3)	Background + Modeled Concentration (µg/m3)	% of Primary NAAQS
PM_{10}	24-hour	150	35.67	18.98	54.65	36%
$PM_{2.5}$	24-hour	35	16.77	8.60	25.37	72%
	Annual	12	7.79	2.34	10.13	84%

Table 6-9. Results of PM_{10} and $PM_{2.5}$ Class II PSD Increment Analysis

Pollutant	Averaging Period	PSD Class II Increment ($\mu g/m^3$)	Modeled Resulting Concentration ($\mu g/m^3$)	% of PSD Class II Increment
PM_{10}	24-hour	30	7.4	25%
	Annual	17	1.65	10%
$PM_{2.5}$	24-hour	9	7.40	82%
	Annual	4	1.65	41%

Table 6-10. Class I Areas within 300 km of FWNA

Site/Class I Area	UTM Cooridnates		Shortest Distance to Fritz Winter (km)
	East (km)	North (km)	
Fritz Winter	539.82	4072.44	-
Mammoth Cave National Park	574.61	4109.48	51
Great Smoky Mountains National Park	774.92	3943.98	268
Joyce Kimer-Slickrock Wilderness	771.57	3928.7	273
Sipsey Wilderness	467.42	3798.71	283
Cohutta Wilderness	716.4	3874.22	265

Table 6-11. Results of PM_{10} and $PM_{2.5}$ Class I Analysis

Pollutant	Averaging Period	PSD Class I Increment ($\mu g/m^3$)	Modeled Resulting Concentration ($\mu g/m^3$)	% of PSD Class I Increment
PM_{10}	24-hour	8	0.1081	1%
	Annual	4	0.0062	0.2%
$PM_{2.5}$	24-hour	2	0.1081	5%
	Annual	1	0.0062	1%

Table 6-12. Results of Toxics Modeling

ID	Arsenic (As) 7440-38-2	Beryllium (Be) 7440-41-7	Cadmium (Cd) 7440-43-9	Cobalt (Co) 7440-48-4	Lead (Pb) 7439-92-1	Manganese (Mn) 7439-96-5	Mercury (Hg) 7439-97-6	Nickel (Ni) 7440-02-0	Selenium (Se) 7782-49-2	Acetaldehyde 75-07-0	Benzene 71-43-2	Cumene 98-82-8	Ethyl Benzene 100-41-4	Formaldehyde 50-00-0	Hexane 110-54-3	Methanol 67-56-1	Naphthalene 91-20-3	Phenol 108-95-2	Toluene 108-88-3	Xylenes 1330-20-7	3-Methylchloranthrene (POM) 56-49-5	7,12-Dimethylbenz(a)anthracene (POM) 57-97-6	Benz(a)anthracene (POM) 56-55-3	Benzo(a)pyrene (POM) 50-32-8	Benzo(b)fluoranthene (POM) 205-99-2	Benzo(k)fluoranthene (POM) 207-08-9	Chrysene (POM) 218-01-9	Dibenzo(a,h)anthracene (POM) 53-70-3	Indeno(1,2,3-cd)pyrene (POM) 193-39-5
ST02	2.03E-04	2.92E-07	1.62E-04	9.75E-05	1.36E-02	8.99E-02	6.33E-06	4.26E-04	7.12E-05	0.00E+00	5.11E-05	0.00E+00	0.00E+00	1.83E-03	4.38E-02	0.00E+00	1.48E-05	0.00E+00	8.27E-05	0.00E+00	4.38E-08	3.89E-07	4.38E-08	2.92E-08	4.38E-08	4.38E-08	4.38E-08	2.92E-08	4.38E-08
ST03	1.16E-06	8.19E-09	7.94E-07	5.59E-07	7.96E-05	5.27E-04	0.00E+00	2.20E-06	4.14E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ST04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ST05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ST06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ST07	7.69E-06	2.36E-06	2.47E-07	6.56E-06	4.09E-05	3.36E-04	0.00E+00	1.43E-05	3.62E-06	0.00E+00	1.84E-02	0.00E+00	1.48E-03	0.00E+00	0.00E+00	0.00E+00	5.53E-02	4.66E-01	2.91E-02	8.40E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ST08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.19E-03	0.00E+00	0.00E+00	3.38E-02	2.11E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ST09	6.21E-06	1.19E-06	1.75E-05	4.53E-06	2.52E-05	4.77E-04	4.08E-06	4.25E-05	3.76E-07	4.70E-02	9.51E-01	0.00E+00	5.21E-02	1.18E-03	2.82E-02	0.00E+00	9.57E-06	0.00E+00	4.30E-01	3.17E-01	2.82E-08	2.51E-07	2.82E-08	1.88E-08	2.82E-08	2.82E-08	2.82E-08	1.88E-08	2.82E-08
ST11	5.39E-08	1.66E-08	1.73E-09	4.60E-08	2.87E-07	2.35E-06	0.00E+00	1.00E-07	2.54E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ST12	1.11E-05	0.00E+00	4.95E-07	1.49E-05	1.04E-05	4.96E-03	0.00E+00	2.15E-04	1.07E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ST13	3.00E-07	0.00E+00	1.34E-08	4.03E-07	2.82E-07	1.34E-04	0.00E+00	5.81E-06	2.88E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ST15A	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.75E-04	1.13E-02	1.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-03	3.15E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ST15B	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.75E-04	1.13E-02	1.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-03	3.15E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ST16	3.93E-06	0.00E+00	1.75E-07	5.27E-06	3.69E-06	1.75E-03	0.00E+00	7.59E-05	3.77E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total	**2.34E-04**	**3.87E-06**	**1.82E-04**	**1.30E-04**	**1.38E-02**	**9.81E-02**	**1.04E-05**	**7.82E-04**	**9.03E-05**	**4.70E-02**	**9.71E-01**	**2.27E-02**	**2.60E-01**	**8.19E-03**	**7.20E-02**	**1.20E-01**	**8.91E-02**	**4.87E-01**	**4.61E-01**	**9.55E-01**	**7.20E-08**	**6.40E-07**	**7.20E-08**	**4.80E-08**	**7.20E-08**	**7.20E-08**	**7.20E-08**	**4.80E-08**	**7.20E-08**
Max modeled concentration (annual avg, $\mu g/m^3$)	0.00003	0.00000	0.00002	0.00002	0.00128	0.01144	0.00000	0.00025	0.00002	0.00420	0.08845	0.05937	0.54410	0.00338	0.00650	0.20244	0.02685	0.07045	0.04422	1.67126	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Carcinogenic SL (ug/m^3)	0.00065	0.0012	0.0016	0.00031				0.011		1.3	0.36		1.1	0.22			0.083				0.00016	0.000014	0.017	0.0017	0.017	0.17	1.7	0.0017	0.017
%CSL	4.62%	0.00%	1.25%	6.45%				2.27%		0.32%	24.57%		49.46%	1.54%			32.35%				0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Noncarcinogenic SL (ug/m^3)	0.016	0.021	0.01	0.0063	0.15	0.052	0.31	0.094	21	9.4	31	420	1000	10	730	21000	3.1	210	5200	100				0.0021					
%NCSL	0.19%	0.00%	0.20%	0.32%	0.85%	22.00%	0.00%	0.27%	0.00%	0.04%	0.29%	0.01%	0.05%	0.03%	0.00%	0.00%	0.87%	0.03%	0.00%	1.67%				0.00%					

[1]Does not include emissions from emergency generators

Table 7-1. VISCREEN Emission Rates

Pollutant	Potential Emissions (tpy)
PM	-
NO_x	51
Primary NO_2[1]	0
Soot[1]	0
Primary SO_4[1]	283

[1]VISCREEN default emission rates

Appendix B
Figures

Figure 2-1. Process Overview
Fritz Winter North America, LP – Franklin, KY

Process Flow Diagram

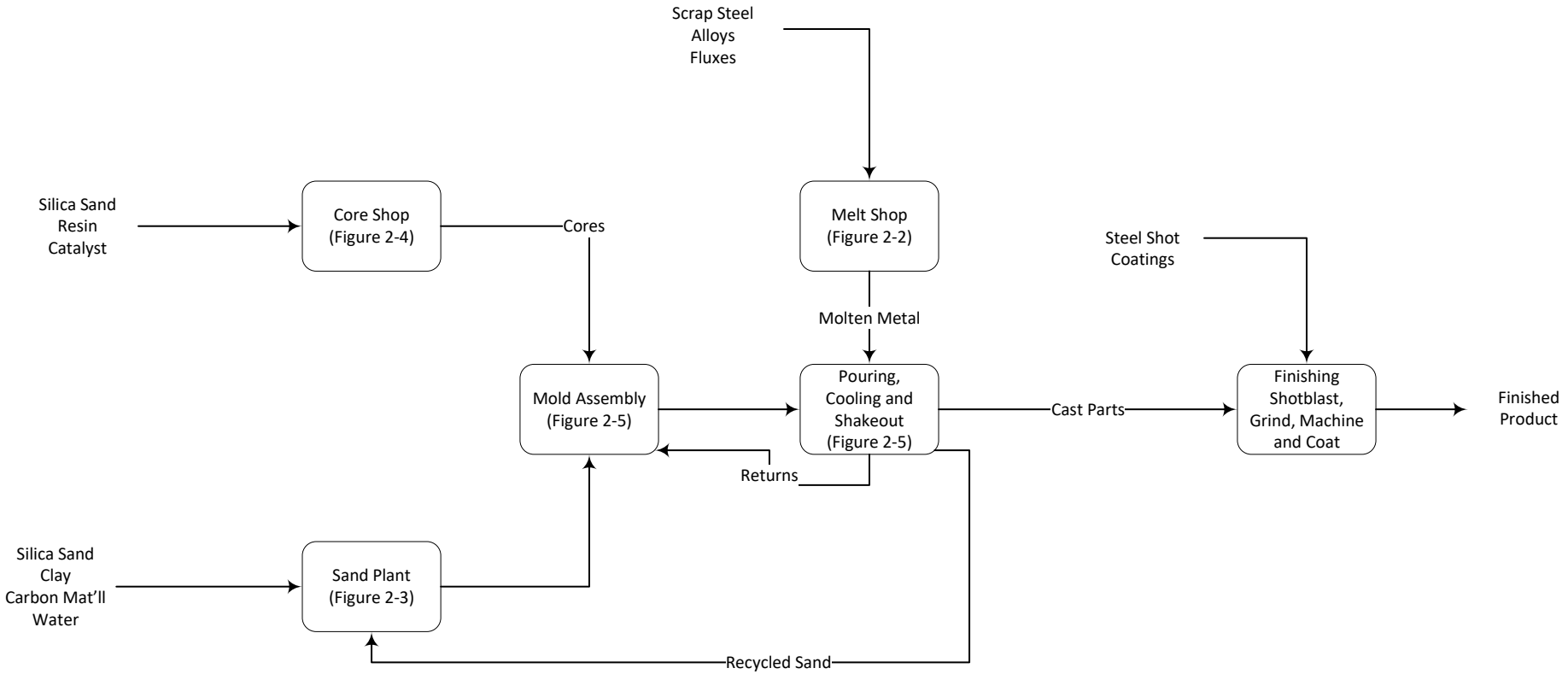

Figure 2-2. Melt Shop
Fritz Winter North America, LP – Franklin, KY

Process Flow Diagram

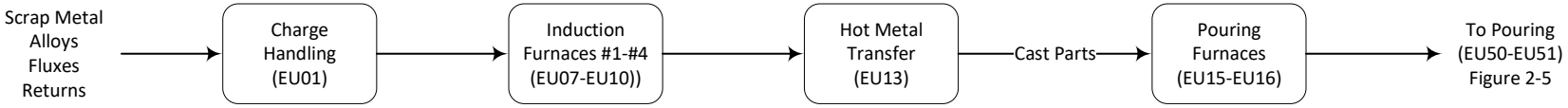

Figure 2-3. Sand Plant
Fritz Winter North America, LP – Franklin, KY

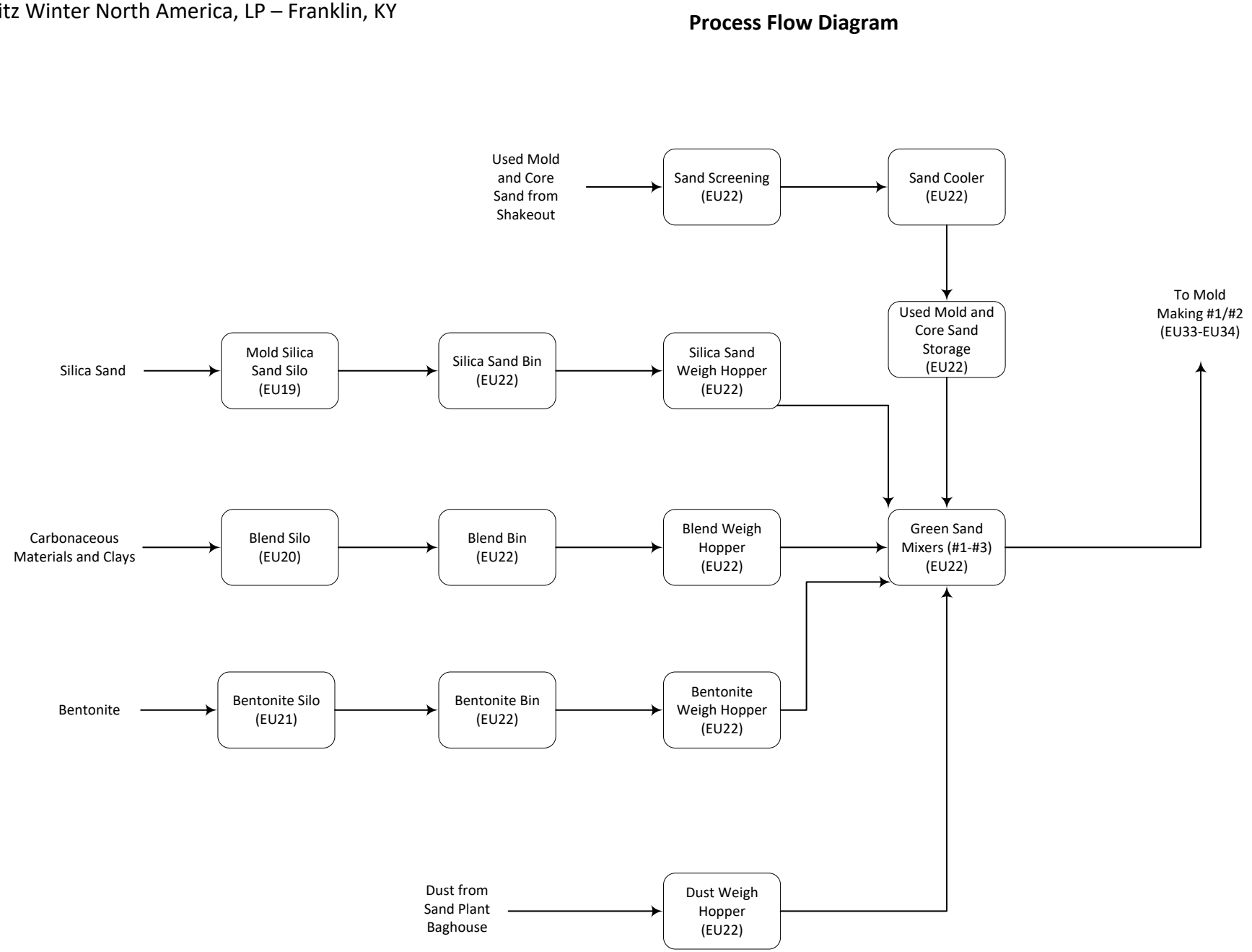

Figure 2-4. Core Shop
Fritz Winter North America, LP – Franklin, KY

Process Flow Diagram

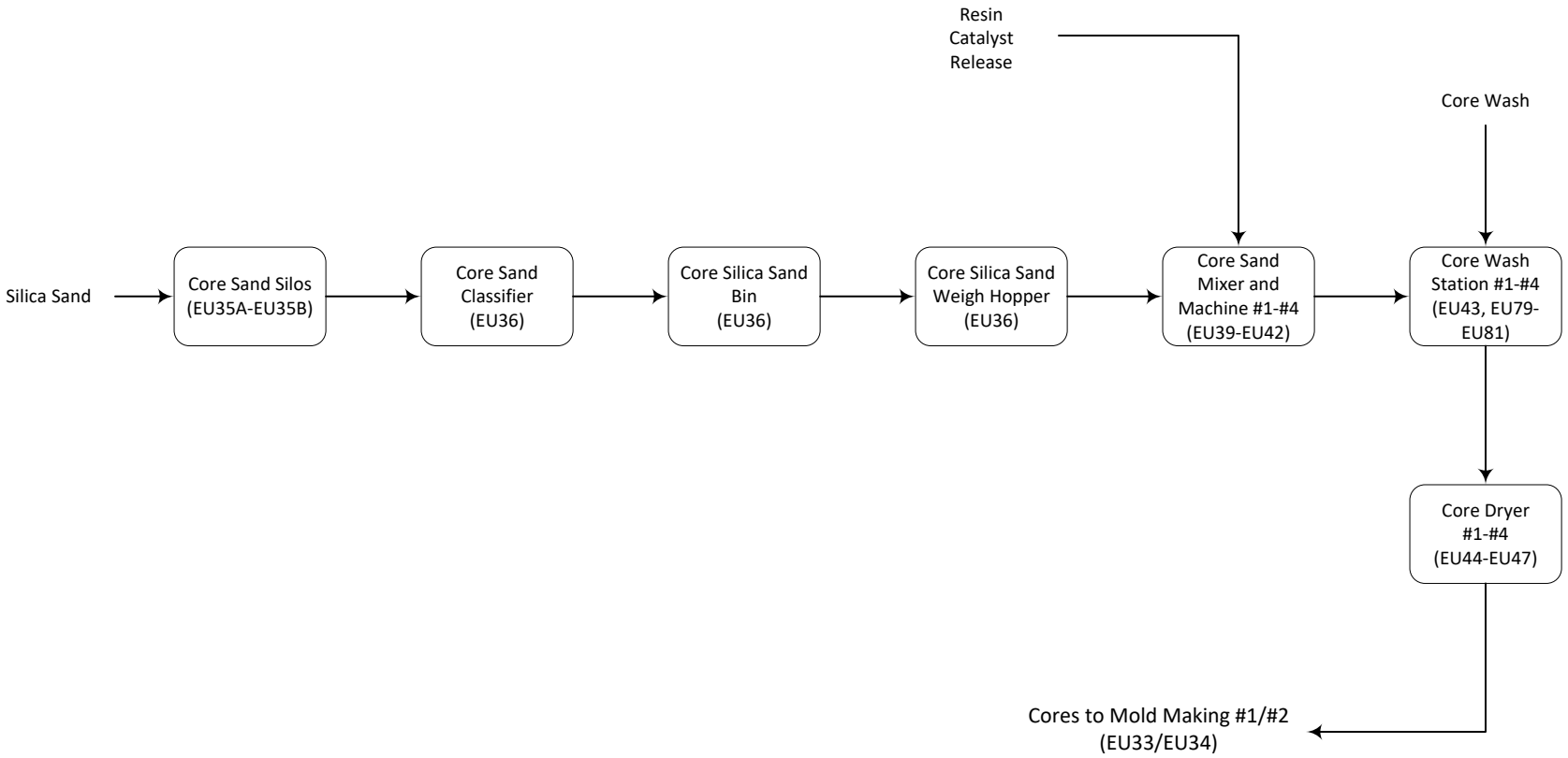

Figure 2-5. Pouring, Cooling and Shakeout
Fritz Winter North America, LP – Franklin, KY

Process Flow Diagram

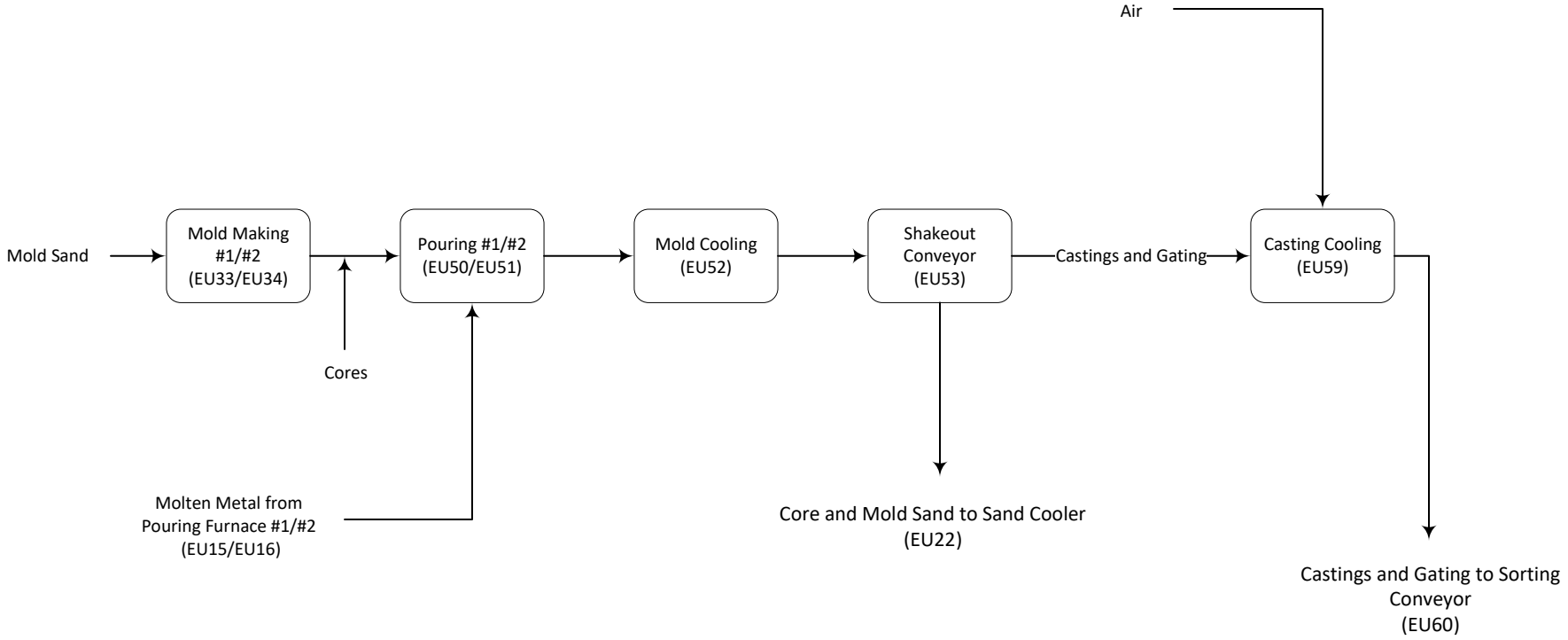

Figure 2-6. Finishing
Fritz Winter North America, LP – Franklin, KY

Process Flow Diagram

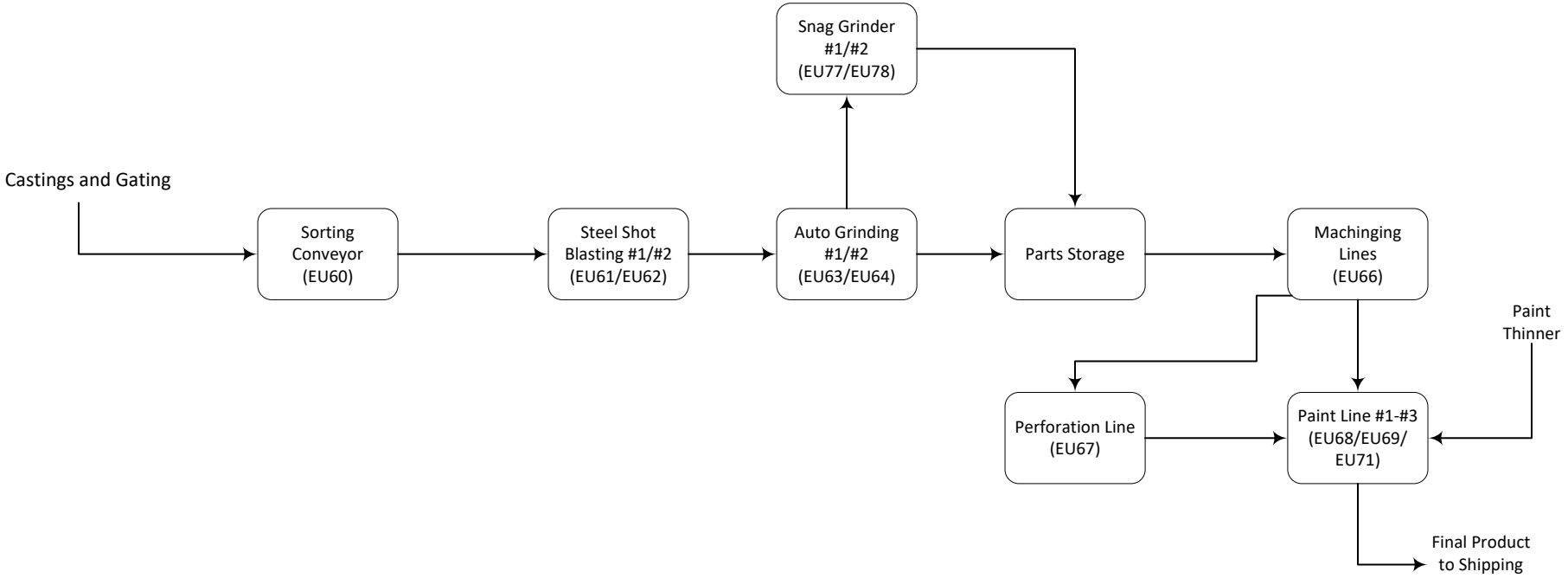

Figure 2-7. Plant Utilities
Fritz Winter North America, LP – Franklin, KY

Process Flow Diagram

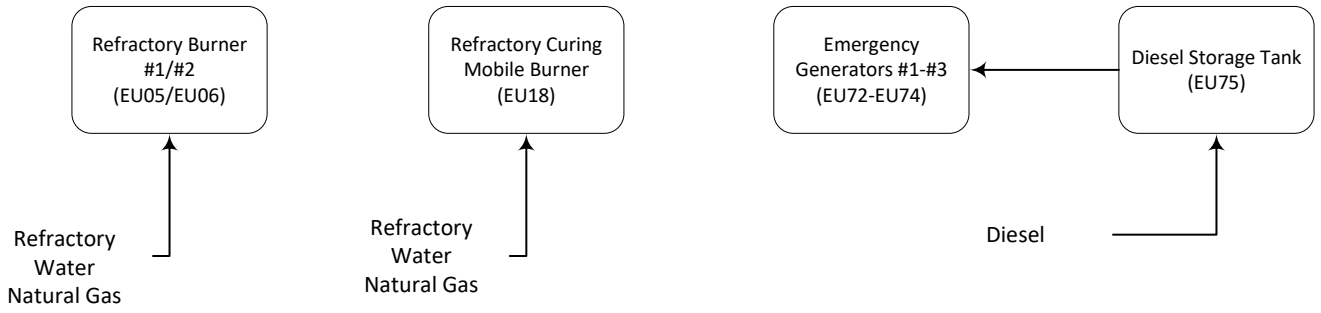

Figure 6-1. FWNA General Building, Emission Points and Property Outline

Figure 6-2. FWNA Location and Surrounding Area

Figure 6-3. SIL and SMC Receptor Locations

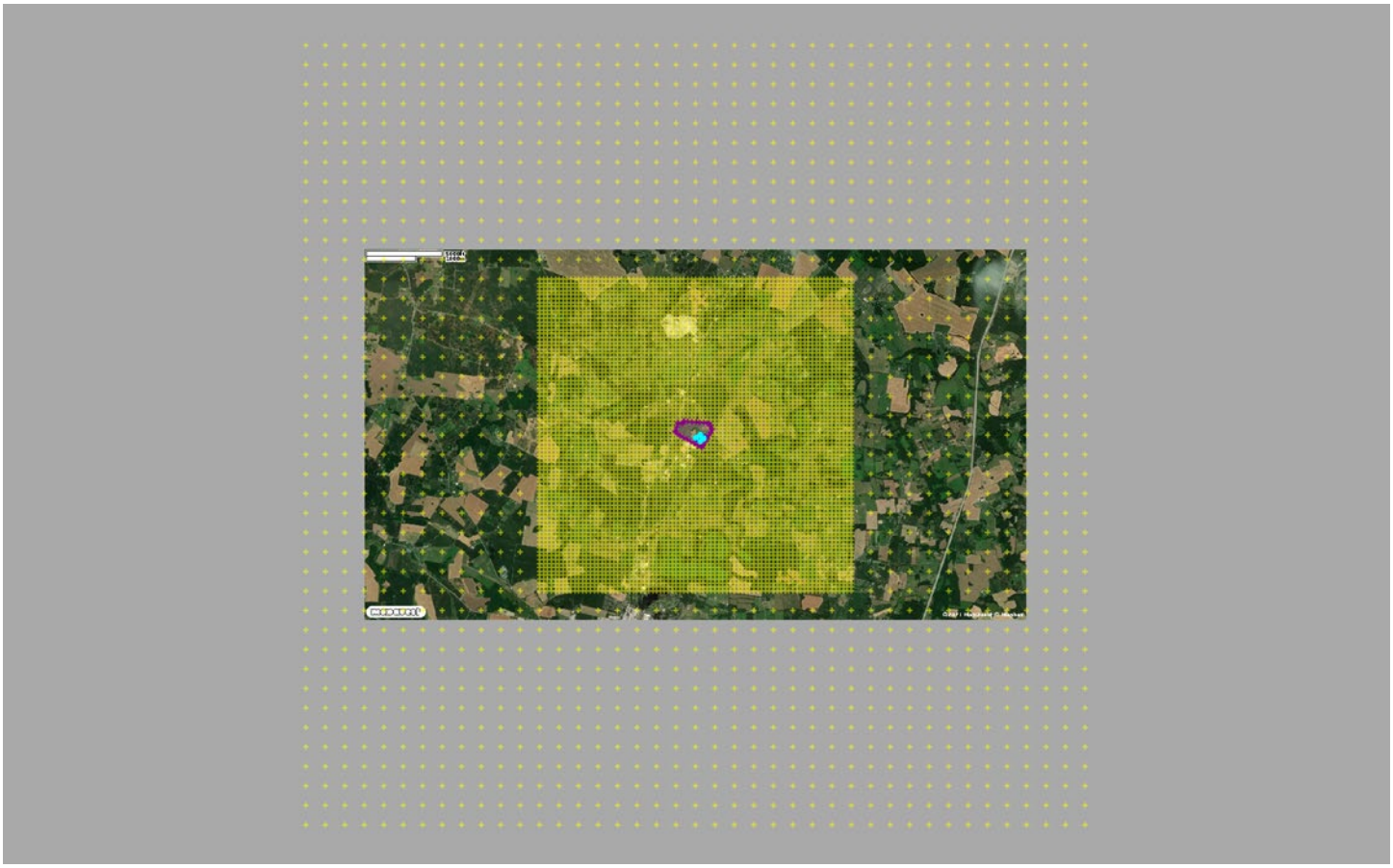

Figure 6-4. 24-hour PM_{10} SIL and SMC Model Output (SIL Radius 806 meters)

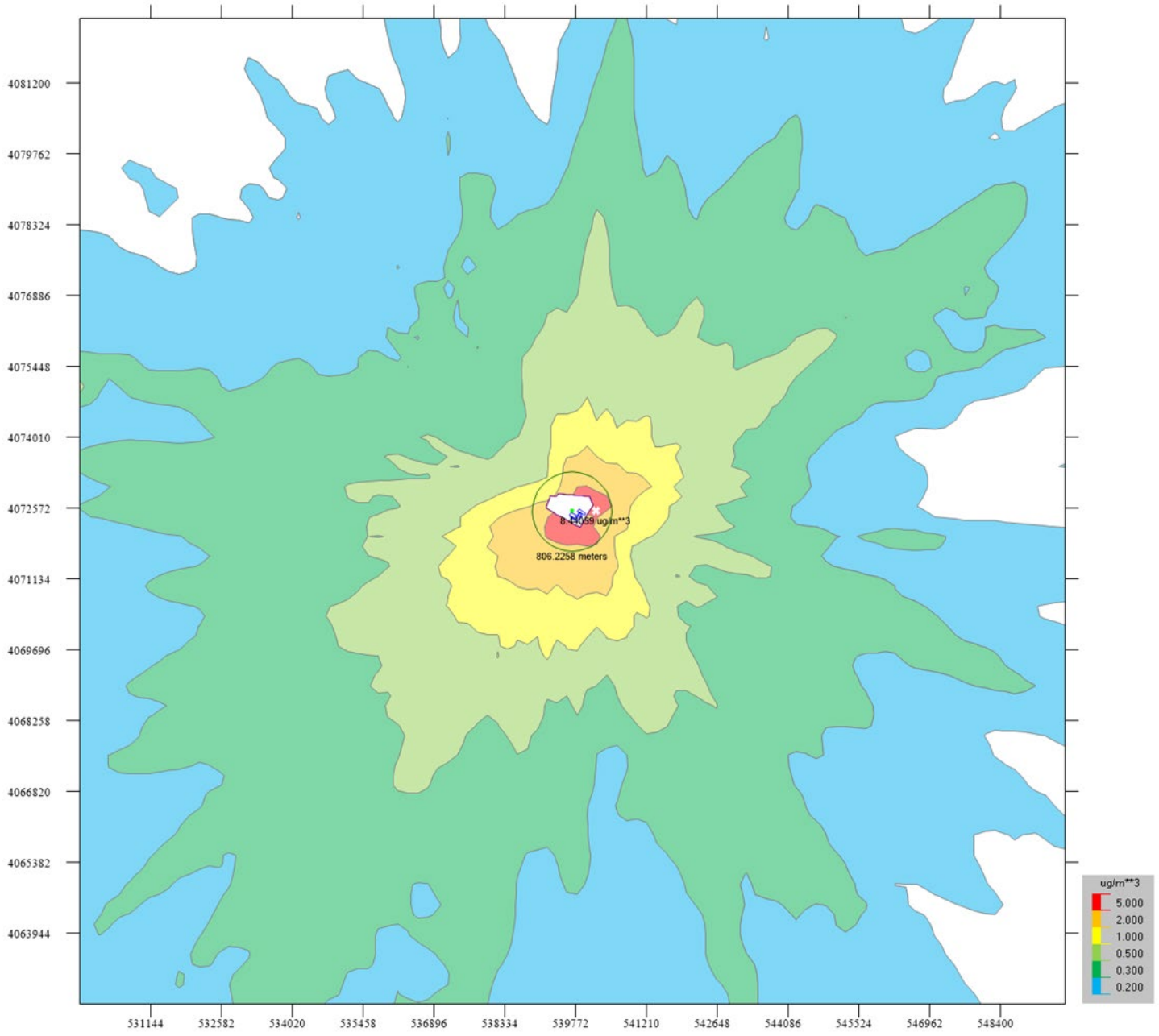

Figure 6-5. Annual PM_{10} SIL and SMC Model Output (SIL Radius 500 meters)

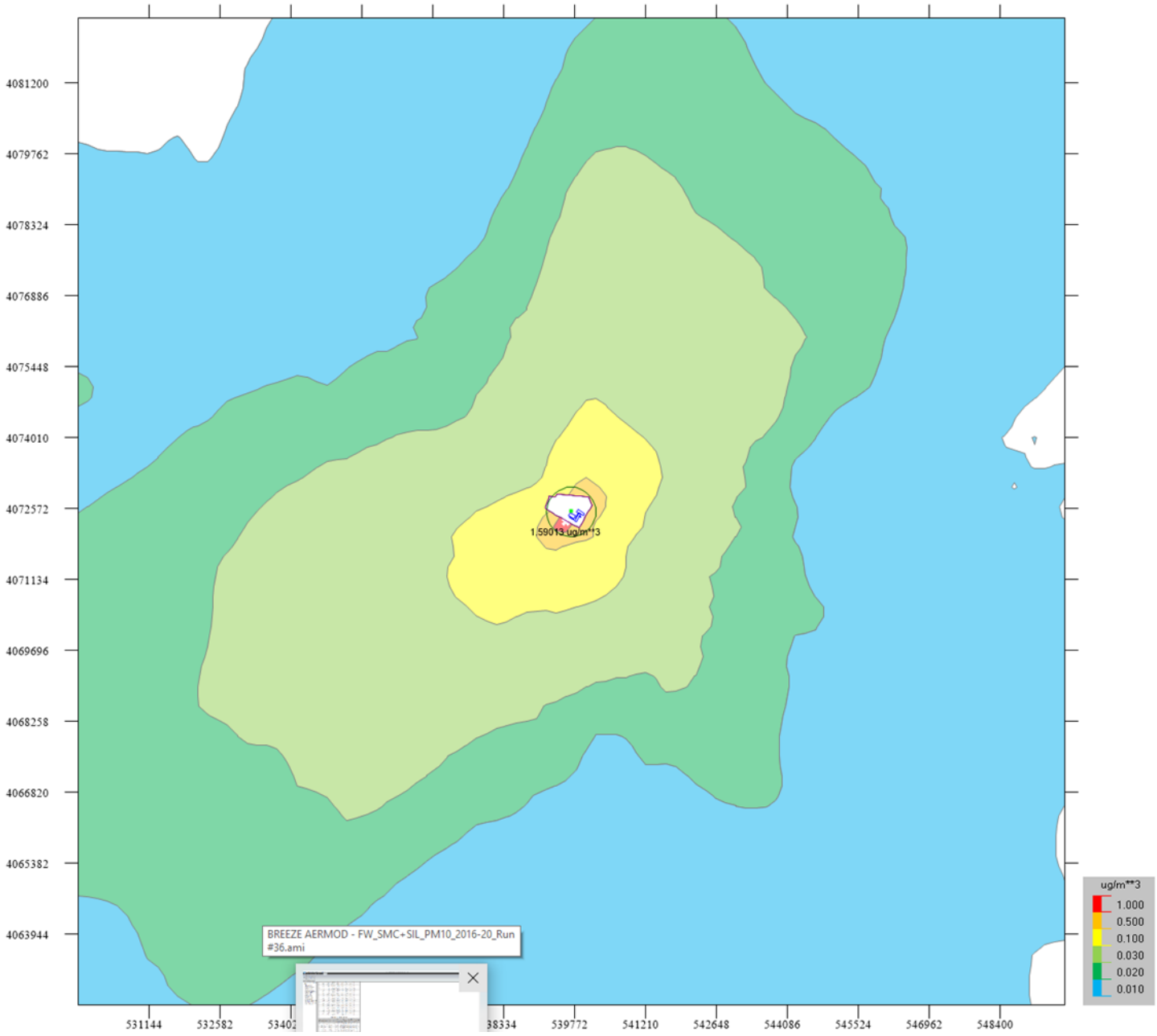

Figure 6-6. 24-hour $PM_{2.5}$ SIL and SMC Model Output (SIL Radius 2,907 meters)

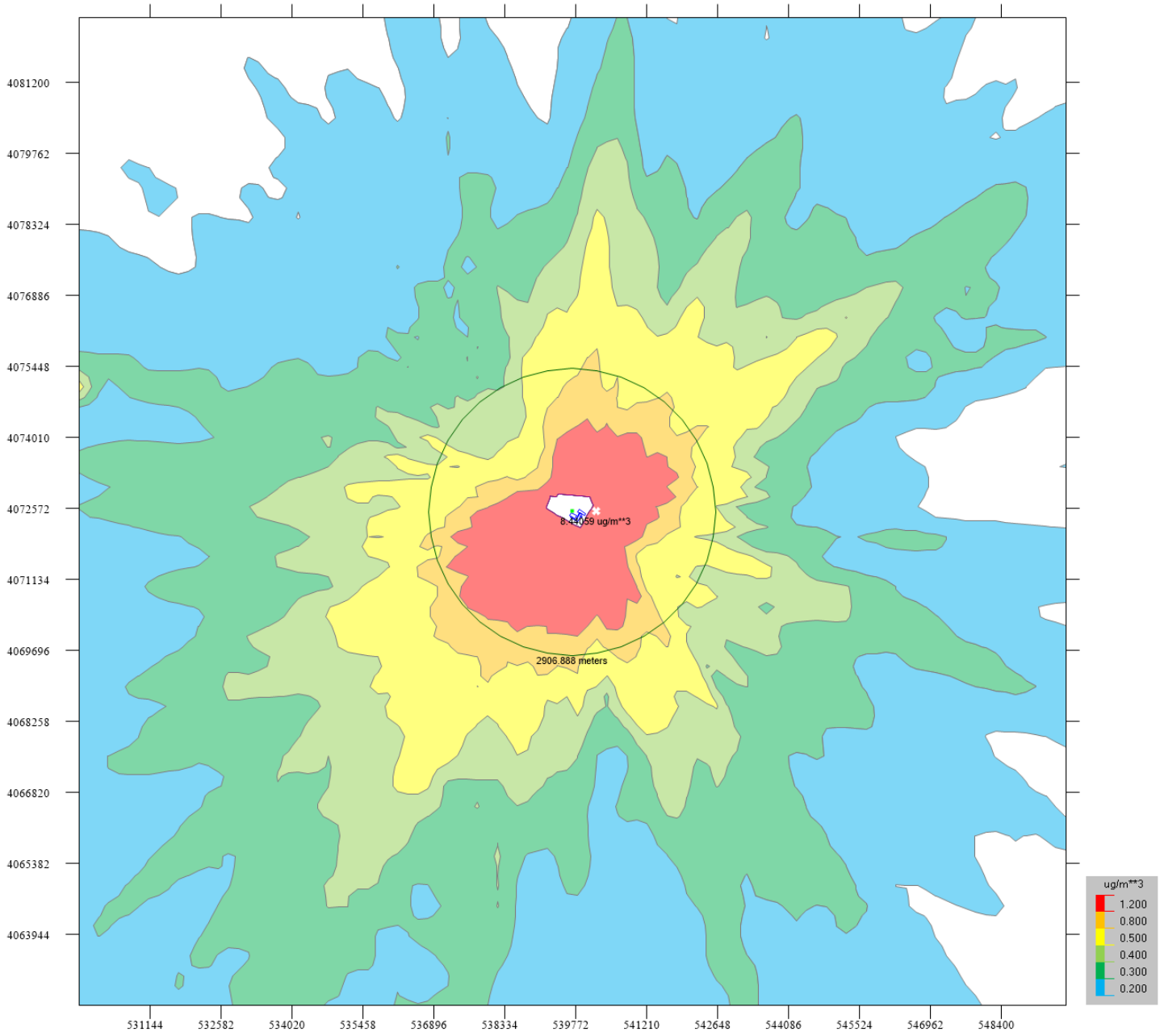

Figure 6-7. Annual $PM_{2.5}$ SIL and SMC Model Output (SIL Radius 1,780 meters)

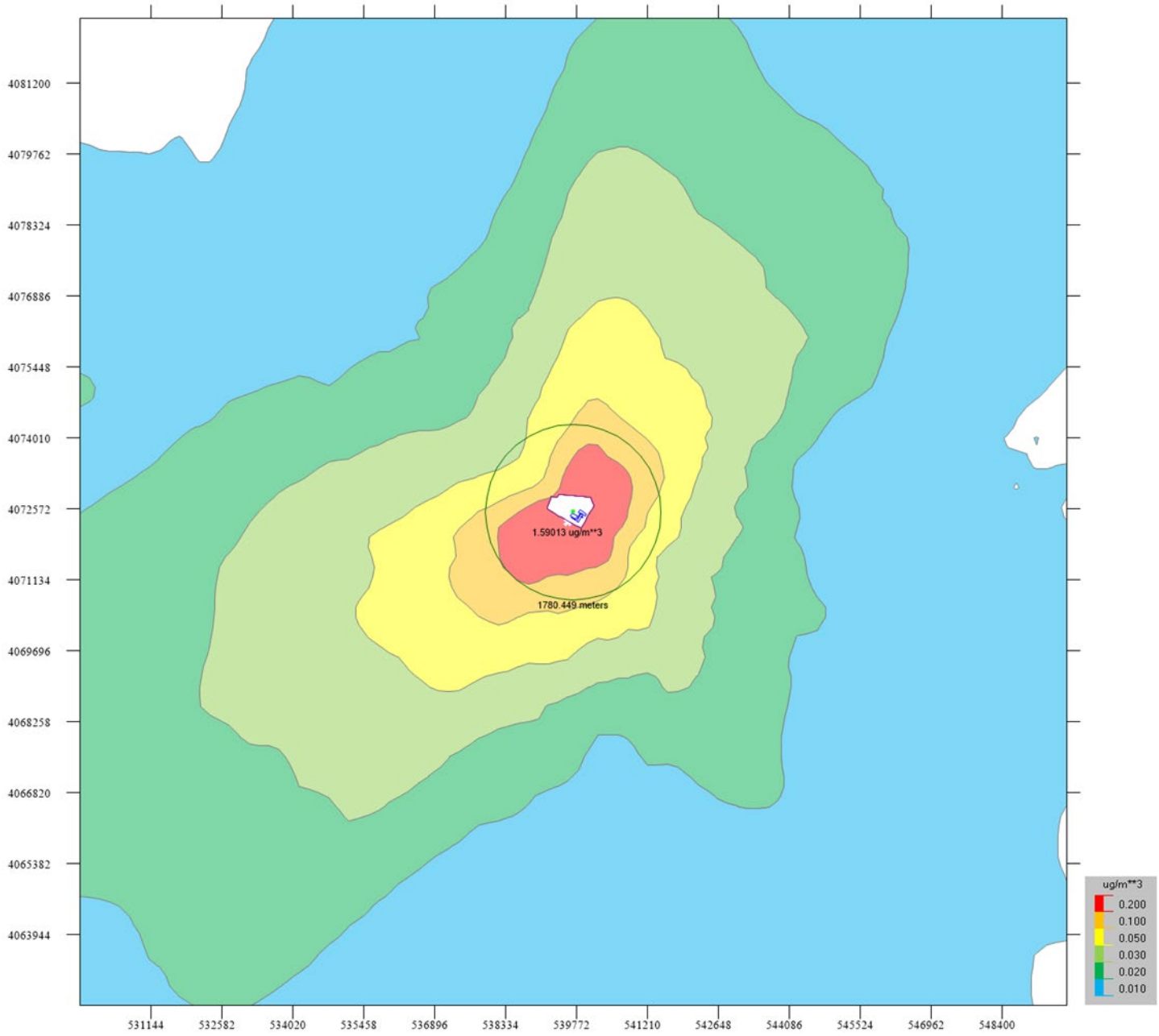

Figure 6-8. PM_{10} and $PM_{2.5}$ Receptor Locations

Figure 6-9. Class I Locations Relative to FWNA

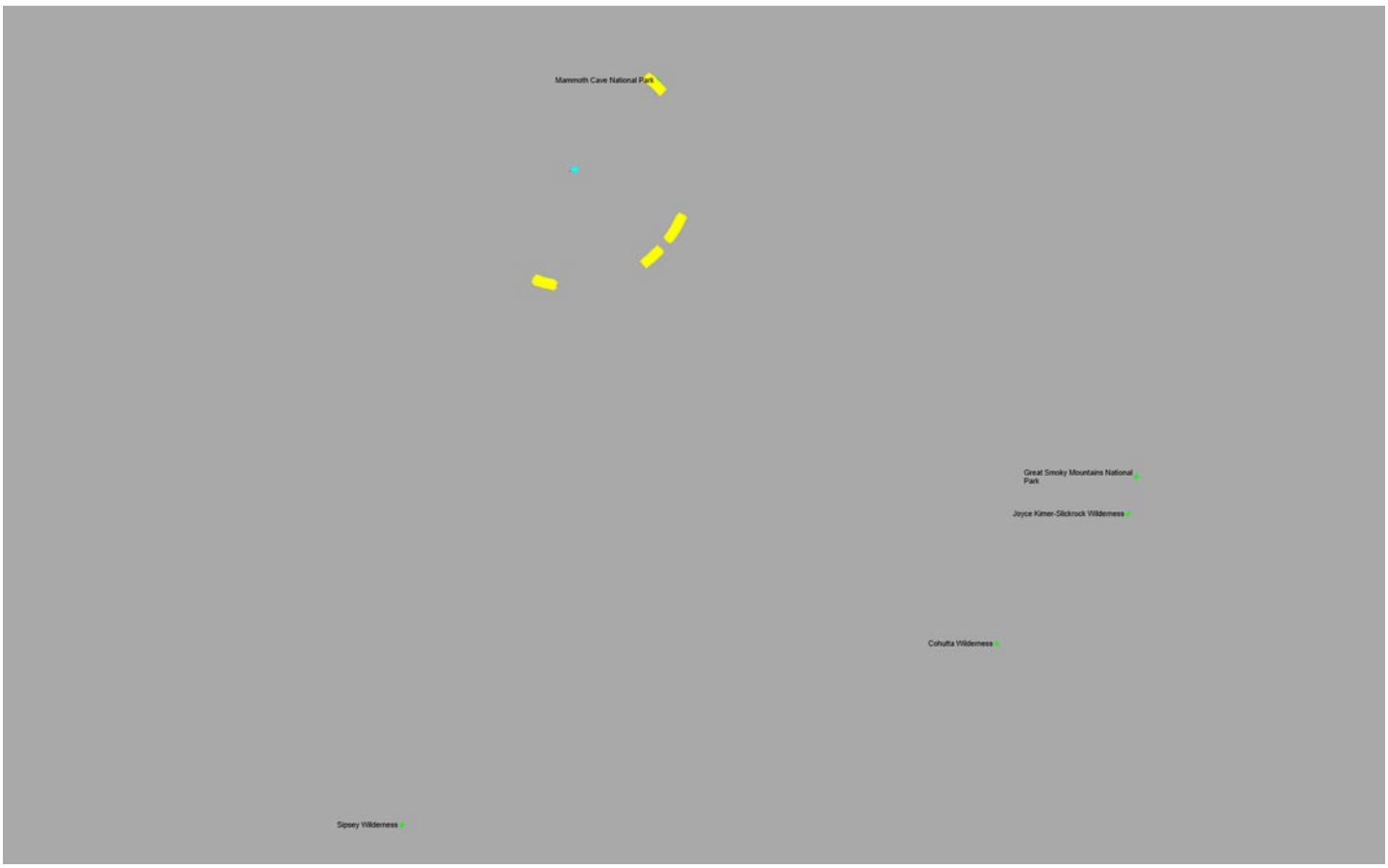

Figure 6-10. 24-Hour $PM_{2.5}$ Concentrations Approaching Class I Areas

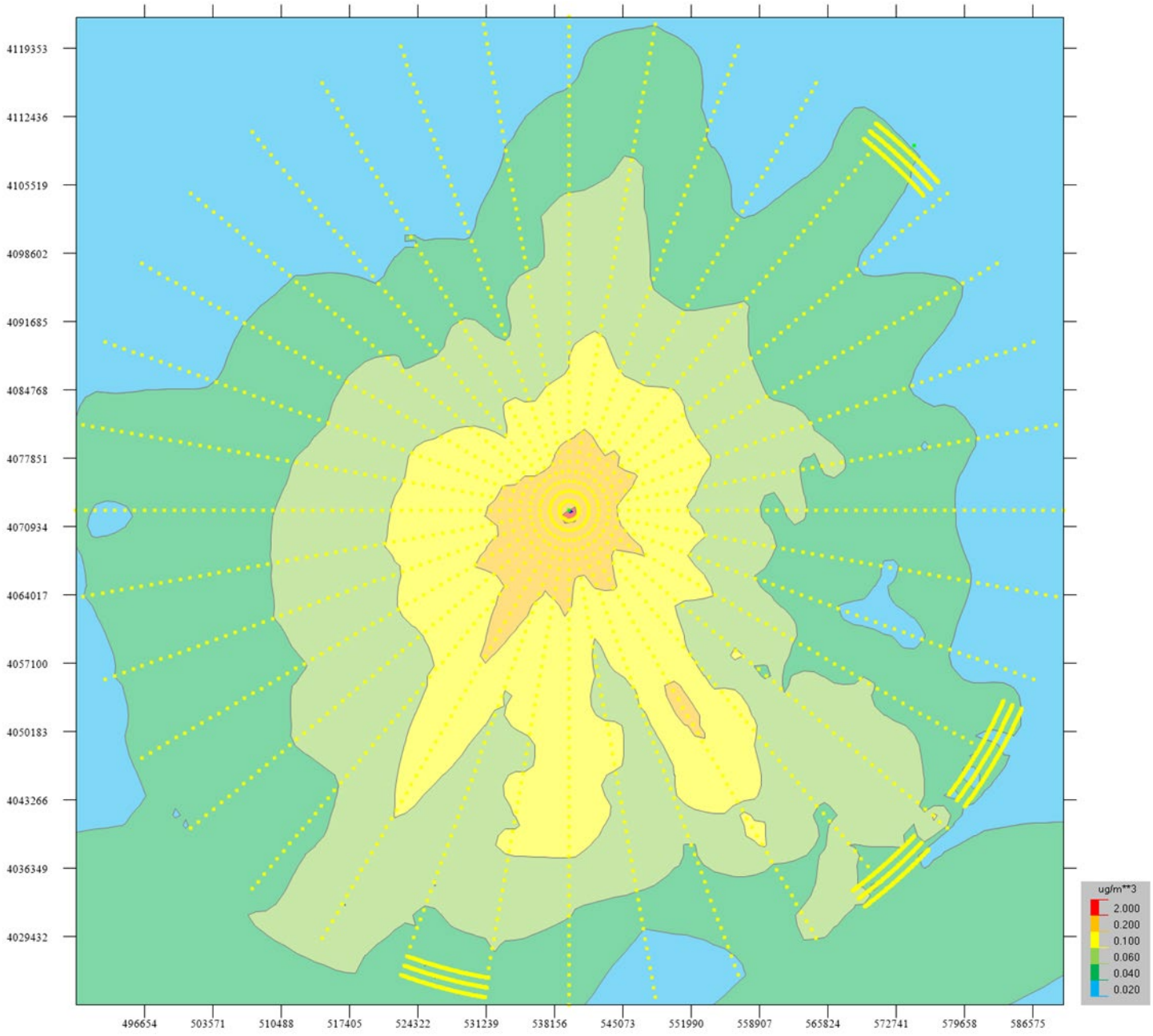

Figure 6-11. Annual $PM_{2.5}$ Concentrations Approaching Class I Areas

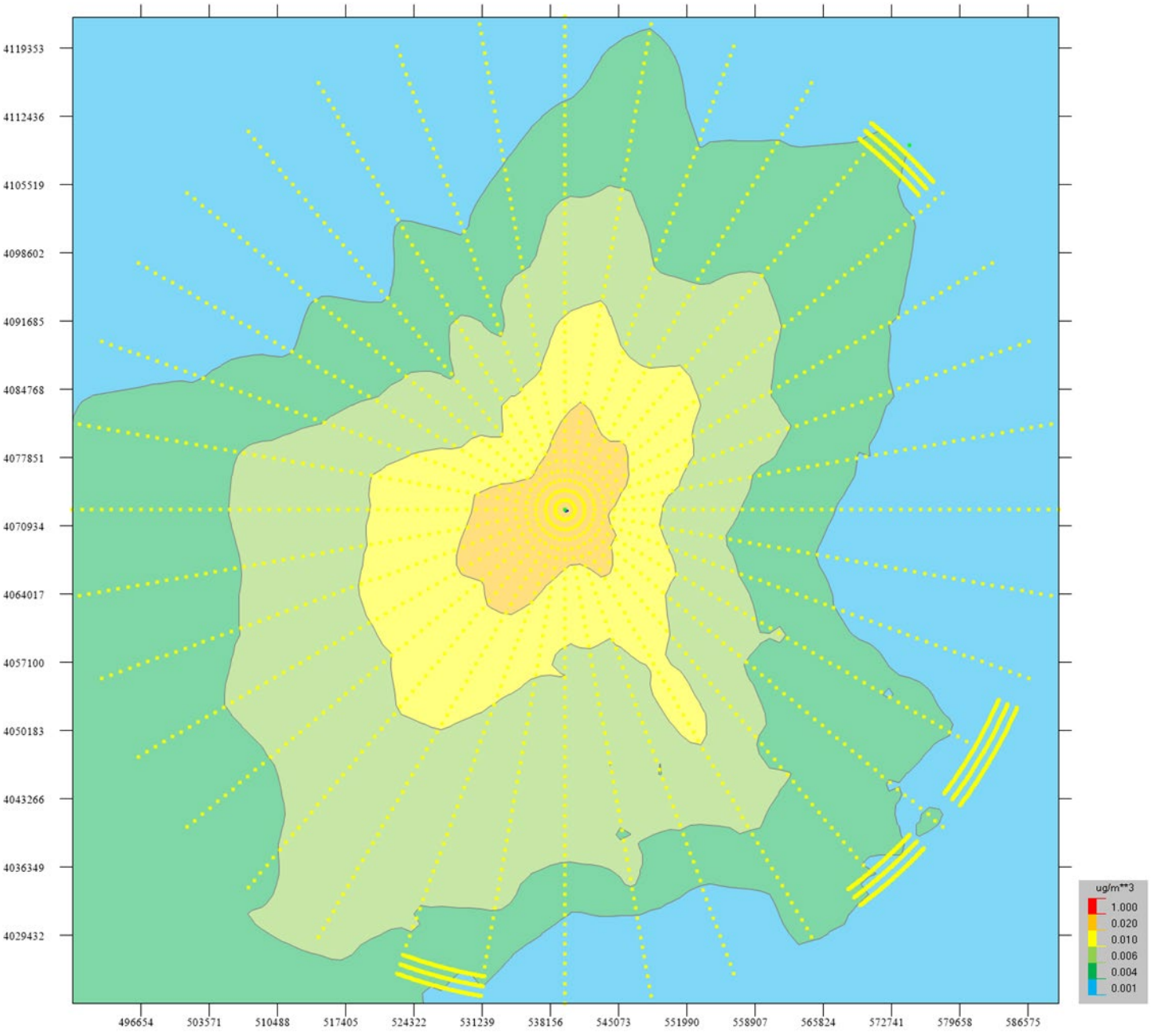

Figure 6-12. Air Toxic Receptor Locations

Appendix C
Emission Calculations

Hourly Hazardous Air Pollutant Emission Summary
Fritz Winter North America, LP
Franklin, Kentucky

Hazardous Air Pollutant Emissions Summary

Pollutant	CAS #	EU05 Refractory Burner #1 (lb/hr)	EU06 Refractory Burner #2 (lb/hr)	EU15 Pouring Furnace #1 (lb/hr)	EU16 Pouring Furnace #2 (lb/hr)	EU18 Refractory Curing Mobile Burner (lb/hr)	EU39 PUCB Core Machine #1 (Resin and Catalyst) (lb/hr)	EU40 PUCB Core Machine #2 (Resin and Catalyst) (lb/hr)	EU41 PUCB Core Machine #3 (Resin and Catalyst) (lb/hr)	EU42 PUCB Core Machine #4 (Resin and Catalyst) (lb/hr)	EU44 Core Dryer #1 (lb/hr)	EU45 Core Dryer #2 (lb/hr)	EU46 Core Dryer #3 (lb/hr)	EU47 Core Dryer #4 (lb/hr)	HAPs Pouring Cooling Shakeout HAPs (Mold) (lb/hr)	HAPs Pouring Cooling Shakeout HAPs (Core) (lb/hr)	EU68 Paint Line #3 (Coating) (lb/hr)	EU68 Paint Line #3 (Thinner) (lb/hr)	EU69 Paint Line #2 (Coating) (lb/hr)	EU69 Paint Line #2 (Thinner) (lb/hr)	EU71 Paint Line #1 (lb/hr)	EU72 Emergency Generator #1 (lb/hr)	EU73 Emergency Generator #2 (lb/hr)	EU74 Emergency Generator #3 (lb/hr)	CU01 Melt Baghouse (CU01) (lb/hr)	CU02 Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02) (lb/hr)	CU06 Sand Plant Baghouse (CU06) (lb/hr)	CU08 Core/Mold Baghouse (CU08) (lb/hr)	CU10 Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10) (lb/hr)	CU11 Fettling Baghouse (CU11) (lb/hr)	CU12 Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12) (lb/hr)	CU13a-h Machining Cartridge Collectors (CU13a-h) (lb/hr)	CU13i-j Machining Cartridge Collectors (CU13i-j) (lb/hr)	TOTAL HAPs/TACs (lb/hr)
Antimony (Sb)	7440-36-0																																	
Arsenic (As)	7440-38-2	1.67E-06	1.67E-06	5.71E-07	5.71E-07	3.92E-07					7.84E-07	7.84E-07	7.84E-07	7.84E-07												1.98E-04	1.16E-06	7.69E-06	3.08E-06	5.39E-08	1.11E-05	3.00E-07	1.96E-06	1.96E-06	**2.34E-04**
Beryllium (Be)	7440-41-7	1.00E-07	1.00E-07	3.42E-08	3.42E-08	2.35E-08					4.71E-08	4.71E-08	4.71E-08	4.71E-08													8.19E-09	2.36E-06	1.00E-06	1.66E-08					**3.87E-06**
Cadmium (Cd)	7440-43-9	9.17E-06	9.17E-06	3.14E-06	3.14E-06	2.16E-06					4.31E-06	4.31E-06	4.31E-06	4.31E-06												1.36E-04	7.94E-07	2.47E-07	2.11E-07	1.73E-09	4.95E-07	1.34E-08	8.74E-08	8.74E-08	**1.82E-04**
Chromium (Cr)	7440-47-3	1.17E-05	1.17E-05	3.99E-06	3.99E-06	2.75E-06					5.49E-06	5.49E-06	5.49E-06	5.49E-06												1.30E-03	7.60E-06	2.13E-05	2.20E-05	1.49E-07	7.80E-04	2.11E-05	1.38E-04	1.38E-04	**2.48E-03**
Cobalt (Co)	7440-48-4	7.00E-07	7.00E-07	2.40E-07	2.40E-07	1.65E-07					3.29E-07	3.29E-07	3.29E-07	3.29E-07												9.54E-05	5.59E-07	6.56E-06	3.21E-06	4.60E-08	1.49E-05	4.03E-07	2.63E-06	2.63E-06	**1.30E-04**
Lead (Pb)	7439-92-1	4.17E-06	4.17E-06	1.43E-06	1.43E-06	9.80E-07					1.96E-06	1.96E-06	1.96E-06	1.96E-06												1.36E-02	7.96E-05	4.09E-05	1.74E-05	2.87E-07	1.04E-05	2.82E-07	1.84E-06	1.84E-06	**1.38E-02**
Manganese (Mn)	7439-96-5	3.17E-06	3.17E-06	1.08E-06	1.08E-06	7.45E-07					1.49E-06	1.49E-06	1.49E-06	1.49E-06												8.99E-02	5.27E-04	3.36E-04	4.71E-04	2.35E-06	4.96E-03	1.34E-04	8.76E-04	8.76E-04	**9.81E-02**
Mercury (Hg)	7439-97-6	2.17E-06	2.17E-06	7.42E-07	7.42E-07	5.10E-07					1.02E-06	1.02E-06	1.02E-06	1.02E-06																					**1.04E-05**
Nickel (Ni)	7440-02-0	1.75E-05	1.75E-05	5.99E-06	5.99E-06	4.12E-06					8.24E-06	8.24E-06	8.24E-06	8.24E-06												3.75E-04	2.20E-06	1.43E-05	9.57E-06	1.00E-07	2.15E-04	5.81E-06	3.80E-05	3.80E-05	**7.82E-04**
Selenium (Se)	7782-49-2	2.00E-07	2.00E-07	6.85E-08	6.85E-08	4.71E-08					9.41E-08	9.41E-08	9.41E-08	9.41E-08												7.06E-05	4.14E-07	3.62E-06		2.54E-08	1.07E-05	2.88E-07	1.88E-06	1.88E-06	**9.03E-05**
1,2,4 Trimethylbenzene	95-63-6																																	
1,3-Butadiene	106-99-0																								3.13E-07									**3.13E-07**
Acenaphthene	83-32-9	1.50E-08	1.50E-08	5.14E-09	5.14E-09	3.53E-09					7.06E-09	7.06E-09	7.06E-09	7.06E-09										7.02E-07	7.02E-07	1.14E-08								**1.49E-06**
Acenaphthylene	208-96-8	1.50E-08	1.50E-08	5.14E-09	5.14E-09	3.53E-09					7.06E-09	7.06E-09	7.06E-09	7.06E-09										1.38E-06	1.38E-06	4.05E-08								**2.88E-06**
Acetaldehyde	75-07-0														1.14E-01									3.78E-06	3.78E-06	6.14E-06								**1.14E-01**
Acetophenone	98-86-2																																	
Acrolein	107-02-8																							1.18E-06	1.18E-06	7.40E-07								**3.10E-06**
Aniline	62-53-3																																	
Anthracene	120-12-7	2.00E-08	2.00E-08	6.85E-09	6.85E-09	4.71E-09					9.41E-09	9.41E-09	9.41E-09	9.41E-09										1.85E-07	1.85E-07	1.50E-08								**4.80E-07**
Benzene	71-43-2	1.75E-05	1.75E-05	5.99E-06	5.99E-06	4.12E-06					8.24E-06	8.24E-06	8.24E-06	8.24E-06	1.84E+00	5.05E-01	5.75E-04		5.75E-04					1.16E-04	1.16E-04	7.46E-06								**2.35E+00**
Cresol	1319-77-3																																	
Cumene	98-82-8																3.45E-03	7.89E-03	3.45E-03	7.89E-03														**2.27E-02**
Dibenzofurans	132-64-9																																	
Dichlorobenzene	25321-22-6	1.00E-05	1.00E-05	3.42E-06	3.42E-06	2.35E-06					4.71E-06	4.71E-06	4.71E-06	4.71E-06																					**4.80E-05**
Ethyl Benzene	100-41-4														1.26E-01	3.59E-03	5.46E-02	4.85E-02	5.46E-02	4.85E-02														**3.36E-01**
Formaldehyde	50-00-0	6.25E-04	6.25E-04	2.14E-04	2.14E-04	1.47E-04	3.15E-03	3.15E-03	3.15E-03	3.15E-03	2.94E-04	2.94E-04	2.94E-04	2.94E-04										1.18E-05	1.18E-05	9.44E-06								**1.56E-02**
Hexane	110-54-3	1.50E-02	1.50E-02	5.14E-03	5.14E-03	3.53E-03					7.06E-03	7.06E-03	7.06E-03	7.06E-03																					**7.20E-02**
Hydrogen Flouride	7664-39-3																																	
Methanol	67-56-1																						1.20E-01											**1.20E-01**
Methyl Chloride	74-87-3																																	
Methylene diphenyl diisocyanate (MDI)	101-68-8																																	
m-Xylene	108-38-3																																	
Naphthalene	91-20-3	5.08E-06	5.08E-06	1.74E-06	1.74E-06	1.20E-06	2.04E-02	2.04E-02	2.04E-02	2.04E-02	2.39E-06	2.39E-06	2.39E-06	2.39E-06		1.34E-01								1.95E-05	1.95E-05	6.78E-07								**2.16E-01**
Nitrobenzene	98-95-3																																	
o-Cresol	95-48-7																																	
o-Xylene	95-47-6																																	
Phenol	108-95-2						1.28E-02	1.28E-02	1.28E-02	1.28E-02						1.13E+00																			**1.18E+00**
Propionaldehyde	123-38-6																																	
P-Xylene	106-42-3																																	
Styrene	100-42-5																																	
Toluene	108-88-3	2.83E-05	2.83E-05	9.70E-06	9.70E-06	6.67E-06					1.33E-05	1.33E-05	1.33E-05	1.33E-05	1.04E+00	7.06E-02	1.15E-03		1.15E-03					4.22E-05	4.22E-05	3.27E-06								**1.11E+00**
Xylenes	1330-20-7														7.67E-01	2.03E-02	2.24E-01	9.10E-02	2.24E-01	9.10E-02				2.90E-05	2.90E-05	2.28E-06								**1.42E+00**
2-Methylnaphthalene (POM)	91-57-6	2.00E-07	2.00E-07	6.85E-08	6.85E-08	4.71E-08					9.41E-08	9.41E-08	9.41E-08	9.41E-08																					**9.60E-07**
3-Methylchloranthrene (POM)	56-49-5	1.50E-08	1.50E-08	5.14E-09	5.14E-09	3.53E-09					7.06E-09	7.06E-09	7.06E-09	7.06E-09																					**7.20E-08**
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.33E-07	1.33E-07	4.56E-08	4.56E-08	3.14E-08					6.27E-08	6.27E-08	6.27E-08	6.27E-08																					**6.40E-07**
Benz(a)anthracene (POM)	56-55-3	1.50E-08	1.50E-08	5.14E-09	5.14E-09	3.53E-09					7.06E-09	7.06E-09	7.06E-09	7.06E-09										9.33E-08	9.33E-08	1.34E-08								**2.72E-07**
Benzo(a)pyrene (POM)	50-32-8	1.00E-08	1.00E-08	3.42E-09	3.42E-09	2.35E-09					4.71E-09	4.71E-09	4.71E-09	4.71E-09										3.86E-08	3.86E-08	1.50E-09								**1.27E-07**
Benzo(b)fluoranthene (POM)	205-99-2	1.50E-08	1.50E-08	5.14E-09	5.14E-09	3.53E-09					7.06E-09	7.06E-09	7.06E-09	7.06E-09										1.67E-07	1.67E-07	7.93E-10								**4.06E-07**
Benzo(g,h,i)perylene (POM)	191-24-2	1.00E-08	1.00E-08	3.42E-09	3.42E-09	2.35E-09					4.71E-09	4.71E-09	4.71E-09	4.71E-09										8.34E-08	8.34E-08	3.91E-09								**2.19E-07**
Benzo(k)fluoranthene (POM)	207-08-9	1.50E-08	1.50E-08	5.14E-09	5.14E-09	3.53E-09					7.06E-09	7.06E-09	7.06E-09	7.06E-09										3.27E-08	3.27E-08	1.24E-09								**1.39E-07**
Chrysene (POM)	218-01-9	1.50E-08	1.50E-08	5.14E-09	5.14E-09	3.53E-09					7.06E-09	7.06E-09	7.06E-09	7.06E-09										2.30E-07	2.30E-07	2.82E-09								**6.34E-07**
Dibenzo(a,h)anthracene (POM)	53-70-3	1.00E-08	1.00E-08	3.42E-09	3.42E-09	2.35E-09					4.71E-09	4.71E-09	4.71E-09	4.71E-09										5.19E-08	5.19E-08	4.66E-09								**1.56E-07**
Fluoranthene (POM)	206-44-0	2.50E-08	2.50E-08	8.56E-09	8.56E-09	5.88E-09					1.18E-08	1.18E-08	1.18E-08	1.18E-08										6.05E-07	6.05E-07	6.09E-08								**1.39E-06**
Fluorene (POM)	86-73-7	2.33E-08	2.33E-08	7.99E-09	7.99E-09	5.49E-09					1.10E-08	1.10E-08	1.10E-08	1.10E-08										1.92E-06	1.92E-06	2.34E-07								**4.19E-06**
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.50E-08	1.50E-08	5.14E-09	5.14E-09	3.53E-09					7.06E-09	7.06E-09	7.06E-09	7.06E-09										6.21E-08	6.21E-08	3.00E-09								**1.99E-07**
Phenanathrene (POM)	85-01-8	1.42E-07	1.42E-07	4.85E-08	4.85E-08	3.33E-08					6.67E-08	6.67E-08	6.67E-08	6.67E-08										6.12E-06	6.12E-06	2.35E-07								**1.32E-05**
Pyrene (POM)	129-00-0	4.17E-08	4.17E-08	1.43E-08	1.43E-08	9.80E-09					1.96E-08	1.96E-08	1.96E-08	1.96E-08										5.57E-07	5.57E-07	3.82E-08								**1.35E-06**
Total HAPs/TACs		**0.016**	**0.016**	**0.005**	**0.005**	**0.004**	**0.036**	**0.036**	**0.036**	**0.036**	**0.007**	**0.007**	**0.007**	**0.007**	**3.888**	**1.863**	**0.283**	**0.147**	**0.283**	**0.147**	**0.120**	**0.000**	**0.000**	**0.000**	**0.106**	**0.001**	**0.000**	**0.001**	**0.000**	**0.006**	**0.000**	**0.001**	**0.001**	**7.070**

Annual Hazardous Air Pollutant Emission Summary
Fritz Winter North
America, LP
Franklin, Kentucky

Hazardous Air Pollutant Emissions Summary

Pollutant	CAS #	EU05 Refractory Burner #1 (tpy)	EU06 Refractory Burner #2 (tpy)	EU15 Pouring Furnace #1 (tpy)	EU16 Pouring Furnace #2 (tpy)	EU18 Refractory Curing Mobile Burner (tpy)	EU39 PUCB Core Machine #1 (Resin and Catalyst) (tpy)	EU40 PUCB Core Machine #2 (Resin and Catalyst) (tpy)	EU41 PUCB Core Machine #3 (Resin and Catalyst) (tpy)	EU42 PUCB Core Machine #4 (Resin and Catalyst) (tpy)	EU44 Core Dryer #1 (tpy)	EU45 Core Dryer #2 (tpy)	EU46 Core Dryer #3 (tpy)	EU47 Core Dryer #4 (tpy)	HAPs Pouring Cooling Shakeout HAPs (Mold) (tpy)	HAPs Pouring Cooling Shakeout HAPs (Core) (tpy)	EU68 Paint Line #3 (Coating) (tpy)	EU68 Paint Line #3 (Thinner) (tpy)	EU69 Paint Line #2 (Coating) (tpy)	EU69 Paint Line #2 (Thinner) (tpy)	EU71 Paint Line #1 (tpy)	EU72 Emergency Generator #1 (tpy)	EU73 Emergency Generator #2 (tpy)	EU74 Emergency Generator #3 (tpy)	CU01 Melt Baghouse (CU01) (tpy)	CU02 Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02) (tpy)	CU06 Sand Plant Baghouse (CU06) (tpy)	CU08 Core/Mold Baghouse (CU08) (tpy)	CU10 Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10) (tpy)	CU11 Fettling Baghouse (CU11) (tpy)	CU12 Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12) (tpy)	CU13a-h Machining Cartridge Collectors (CU13a-h) (tpy)	CU13i-j Machining Cartridge Collectors (CU13i-j) (tpy)	TOTAL HAPs/TACs (tpy)
Antimony (Sb)	7440-36-0																																	
Arsenic (As)	7440-38-2	7.30E-06	7.30E-06	2.50E-06	2.50E-06	1.72E-06					3.44E-06	3.44E-06	3.44E-06	3.44E-06												8.69E-04	5.09E-06	3.37E-05	1.35E-05	2.38E-07	4.87E-05	1.32E-06	8.60E-06	8.60E-06	**1.02E-03**
Beryllium (Be)	7440-41-7	4.38E-07	4.38E-07	1.50E-07	1.50E-07	1.03E-07					2.06E-07	2.06E-07	2.06E-07	2.06E-07													3.59E-08	1.03E-05	4.40E-06	7.26E-08						**1.70E-05**
Cadmium (Cd)	7440-43-9	4.02E-05	4.02E-05	1.37E-05	1.37E-05	9.45E-06					1.89E-05	1.89E-05	1.89E-05	1.89E-05												5.94E-04	3.48E-06	1.08E-06	9.24E-07	7.60E-09	2.17E-06	5.85E-08	3.83E-07	3.83E-07	**7.95E-04**
Chromium (Cr)	7440-47-3	5.11E-05	5.11E-05	1.75E-05	1.75E-05	1.20E-05					2.40E-05	2.40E-05	2.40E-05	2.40E-05												5.68E-03	3.33E-05	9.33E-05	9.65E-05	6.55E-07	3.42E-03	9.23E-05	6.03E-04	6.03E-04	**1.09E-02**
Cobalt (Co)	7440-48-4	3.07E-06	3.07E-06	1.05E-06	1.05E-06	7.21E-07					1.44E-06	1.44E-06	1.44E-06	1.44E-06												4.18E-04	2.45E-06	2.87E-05	1.41E-05	2.01E-07	6.53E-05	1.76E-06	1.15E-05	1.15E-05	**5.68E-04**
Lead (Pb)	7439-92-1	1.83E-05	1.83E-05	6.25E-06	6.25E-06	4.29E-06					8.59E-06	8.59E-06	8.59E-06	8.59E-06												5.95E-02	3.49E-04	1.79E-04	7.61E-05	1.25E-06	4.57E-05	1.23E-06	8.07E-06	8.07E-06	**6.03E-02**
Manganese (Mn)	7439-96-5	1.39E-05	1.39E-05	4.75E-06	4.75E-06	3.26E-06					6.53E-06	6.53E-06	6.53E-06	6.53E-06												3.94E-01	2.31E-03	1.47E-03	2.06E-03	1.03E-05	2.17E-02	5.87E-04	3.84E-03	3.84E-03	**4.30E-01**
Mercury (Hg)	7439-97-6	9.49E-06	9.49E-06	3.25E-06	3.25E-06	2.23E-06					4.47E-06	4.47E-06	4.47E-06	4.47E-06																					**4.56E-05**
Nickel (Ni)	7440-02-0	7.67E-05	7.67E-05	2.62E-05	2.62E-05	1.80E-05					3.61E-05	3.61E-05	3.61E-05	3.61E-05												1.64E-03	9.63E-06	6.25E-05	4.19E-05	4.38E-07	9.42E-04	2.54E-05	1.66E-04	1.66E-04	**3.43E-03**
Selenium (Se)	7782-49-2	8.76E-07	8.76E-07	3.00E-07	3.00E-07	2.06E-07					4.12E-07	4.12E-07	4.12E-07	4.12E-07												3.09E-04	1.81E-06	1.59E-05		1.11E-07	4.67E-05	1.26E-06	8.25E-06	8.25E-06	**3.96E-04**
1,2,4 Trimethylbenzene	95-63-6																																	
1,3-Butadiene	106-99-0																								1.56E-08									**1.56E-08**
Acenaphthene	83-32-9	6.57E-08	6.57E-08	2.25E-08	2.25E-08	1.55E-08					3.09E-08	3.09E-08	3.09E-08	3.09E-08									3.51E-08	3.51E-08	5.68E-10									**3.86E-07**
Acenaphthylene	208-96-8	6.57E-08	6.57E-08	2.25E-08	2.25E-08	1.55E-08					3.09E-08	3.09E-08	3.09E-08	3.09E-08									6.92E-08	6.92E-08	2.02E-09									**4.56E-07**
Acetaldehyde	75-07-0														0.2057								1.89E-07	1.89E-07	3.07E-07									**2.06E-01**
Acetophenone	98-86-2																																	
Acrolein	107-02-8																						5.91E-08	5.91E-08	3.70E-08									**1.55E-07**
Aniline	62-53-3																																	
Anthracene	120-12-7	8.76E-08	8.76E-08	3.00E-08	3.00E-08	2.06E-08					4.12E-08	4.12E-08	4.12E-08	4.12E-08									9.23E-09	9.23E-09	7.48E-10									**4.40E-07**
Benzene	71-43-2	7.67E-05	7.67E-05	2.62E-05	2.62E-05	1.80E-05					3.61E-05	3.61E-05	3.61E-05	3.61E-05	3.3331	0.9129	2.52E-03		2.52E-03				5.82E-06	5.82E-06	3.73E-07									**4.25E+00**
Cresol	1319-77-3																																	
Cumene	98-82-8																1.51E-02	3.45E-02	1.51E-02	3.45E-02														**9.93E-02**
Dibenzofurans	132-64-9																																	
Dichlorobenzene	25321-22-6	4.38E-05	4.38E-05	1.50E-05	1.50E-05	1.03E-05					2.06E-05	2.06E-05	2.06E-05	2.06E-05																					**2.10E-04**
Ethyl Benzene	100-41-4														0.2282	0.0065	2.39E-01	2.13E-01	2.39E-01	2.13E-01														**1.14E+00**
Formaldehyde	50-00-0	2.74E-03	2.74E-03	9.37E-04	9.37E-04	6.44E-04	5.69E-03	5.69E-03	5.69E-03	5.69E-03	1.29E-03	1.29E-03	1.29E-03	1.29E-03									5.92E-07	5.92E-07	4.72E-07									**3.59E-02**
Hexane	110-54-3	6.57E-02	6.57E-02	2.25E-02	2.25E-02	1.55E-02					3.09E-02	3.09E-02	3.09E-02	3.09E-02																					**3.16E-01**
Hydrogen Flouride	7664-39-3																																	
Methanol	67-56-1																					5.27E-01												**5.27E-01**
Methyl Chloride	74-87-3																																	
Methylene diphenyl diisocyanate (MDI)	101-68-8																																	
m-Xylene	108-38-3																																	
Naphthalene	91-20-3	2.23E-05	2.23E-05	7.62E-06	7.62E-06	5.24E-06	3.70E-02	3.70E-02	3.70E-02	3.70E-02	1.05E-05	1.05E-05	1.05E-05	1.05E-05		0.2423							9.75E-07	9.75E-07	3.39E-08									**3.90E-01**
Nitrobenzene	98-95-3																																	
o-Cresol	95-48-7																																	
o-Xylene	95-47-6																																	
Phenol	108-95-2						2.31E-02	2.31E-02	2.31E-02	2.31E-02						2.0421																			**2.13E+00**
Propionaldehyde	123-38-6																																	
P-Xylene	106-42-3																																	
Styrene	100-42-5																																	
Toluene	108-88-3	1.24E-04	1.24E-04	4.25E-05	4.25E-05	2.92E-05					5.84E-05	5.84E-05	5.84E-05	5.84E-05	1.8816	0.1276	5.04E-03		5.04E-03				2.11E-06	2.11E-06	1.64E-07									**2.02E+00**
Xylenes	1330-20-7														1.3879	0.0368	9.80E-01	3.99E-01	9.80E-01	3.99E-01			1.45E-06	1.45E-06	1.14E-07									**4.18E+00**
2-Methylnaphthalene (POM)	91-57-6	8.76E-07	8.76E-07	3.00E-07	3.00E-07	2.06E-07					4.12E-07	4.12E-07	4.12E-07	4.12E-07																					**4.21E-06**
3-Methylchloranthrene (POM)	56-49-5	6.57E-08	6.57E-08	2.25E-08	2.25E-08	1.55E-08					3.09E-08	3.09E-08	3.09E-08	3.09E-08																					**3.16E-07**
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	5.84E-07	5.84E-07	2.00E-07	2.00E-07	1.37E-07					2.75E-07	2.75E-07	2.75E-07	2.75E-07																					**2.80E-06**
Benz(a)anthracene (POM)	56-55-3	6.57E-08	6.57E-08	2.25E-08	2.25E-08	1.55E-08					3.09E-08	3.09E-08	3.09E-08	3.09E-08									4.67E-09	4.67E-09	6.72E-10									**3.26E-07**
Benzo(a)pyrene (POM)	50-32-8	4.38E-08	4.38E-08	1.50E-08	1.50E-08	1.03E-08					2.06E-08	2.06E-08	2.06E-08	2.06E-08									1.93E-09	1.93E-09	7.52E-11									**2.14E-07**
Benzo(b)fluoranthene (POM)	205-99-2	6.57E-08	6.57E-08	2.25E-08	2.25E-08	1.55E-08					3.09E-08	3.09E-08	3.09E-08	3.09E-08									8.33E-09	8.33E-09	3.96E-11									**3.32E-07**
Benzo(g,h,i)perylene (POM)	191-24-2	4.38E-08	4.38E-08	1.50E-08	1.50E-08	1.03E-08					2.06E-08	2.06E-08	2.06E-08	2.06E-08									4.17E-09	4.17E-09	1.96E-10									**2.19E-07**
Benzo(k)fluoranthene (POM)	207-08-9	6.57E-08	6.57E-08	2.25E-08	2.25E-08	1.55E-08					3.09E-08	3.09E-08	3.09E-08	3.09E-08									1.64E-09	1.64E-09	6.20E-11									**3.19E-07**
Chrysene (POM)	218-01-9	6.57E-08	6.57E-08	2.25E-08	2.25E-08	1.55E-08					3.09E-08	3.09E-08	3.09E-08	3.09E-08									1.15E-08	1.15E-08	1.41E-10									**3.39E-07**
Dibenzo(a,h)anthracene (POM)	53-70-3	4.38E-08	4.38E-08	1.50E-08	1.50E-08	1.03E-08					2.06E-08	2.06E-08	2.06E-08	2.06E-08									2.60E-09	2.60E-09	2.33E-10									**2.16E-07**
Fluoranthene (POM)	206-44-0	1.10E-07	1.10E-07	3.75E-08	3.75E-08	2.58E-08					5.15E-08	5.15E-08	5.15E-08	5.15E-08									3.02E-08	3.02E-08	3.04E-09									**5.89E-07**
Fluorene (POM)	86-73-7	1.02E-07	1.02E-07	3.50E-08	3.50E-08	2.40E-08					4.81E-08	4.81E-08	4.81E-08	4.81E-08									9.60E-08	9.60E-08	1.17E-08									**6.94E-07**
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	6.57E-08	6.57E-08	2.25E-08	2.25E-08	1.55E-08					3.09E-08	3.09E-08	3.09E-08	3.09E-08									3.11E-09	3.11E-09	1.50E-10									**3.22E-07**
Phenanathrene (POM)	85-01-8	6.21E-07	6.21E-07	2.12E-07	2.12E-07	1.46E-07					2.92E-07	2.92E-07	2.92E-07	2.92E-07									3.06E-07	3.06E-07	1.18E-08									**3.60E-06**
Pyrene (POM)	129-00-0	1.83E-07	1.83E-07	6.25E-08	6.25E-08	4.29E-08					8.59E-08	8.59E-08	8.59E-08	8.59E-08									2.78E-08	2.78E-08	1.91E-09									**9.34E-07**
Total HAPs/TACs		**0.069**	**0.069**	**0.024**	**0.024**	**0.016**	**0.066**	**0.066**	**0.066**	**0.066**	**0.032**	**0.032**	**0.032**	**0.032**	**7.037**	**3.368**	**1.242**	**0.646**	**1.242**	**0.646**	**0.527**	**0.000**	**0.000**	**0.000**	**0.463**	**0.003**	**0.002**	**0.002**	**0.000**	**0.026**	**0.001**	**0.005**	**0.005**	**15.806**

Hourly Criteria Pollutant Emission Summary
Fritz Winter North
America, LP
Franklin, Kentucky

PROCESS	EU ID	Stack ID	Emissions Estimates - PSD Regulated Pollutants lbs/hr PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO2e	
Charge Handling	EU01	ST02										Note 1
Refractory Burner #1	EU05	ST02				0.005	0.833	0.046	0.700	4.17E-06	1,000	Note 1
Refractory Burner #2	EU06	ST02				0.005	0.833	0.046	0.700	4.17E-06	1,000	Note 1
Induction Furnace #1	EU07	ST02						0.930	5.000			Note 1
Induction Furnace #2	EU08	ST02						0.930	5.000			Note 1
Induction Furnace #3	EU09	ST02						0.930	5.000			Note 1
Induction Furnace #4	EU10	ST02						0.930	5.000			Note 1
Hot Metal Transfer	EU13	ST02										Note 1
Pouring Furnace #1	EU15	ST02				*0.002*	*0.285*	*0.016*	*0.240*	*1.43E-06*	*342*	Note 1
Pouring Furnace #2	EU16	ST02				*0.002*	*0.285*	*0.016*	*0.240*	*1.43E-06*	*342*	Note 1
Melt Baghouse Dust Silo	EU17	ST03										Note 1
Refractory Curing Mobile Burner	EU18	ST02				*0.001*	*0.196*	*0.011*	*0.165*	*9.80E-07*	*235*	Note 1
Mold Silica Sand Silo	EU19	ST04										Note 1
Blend Silo	EU20	ST05										Note 1
Bentonite Silo	EU21	ST06										Note 1
Mold Sand Handling and Preparation	EU22	ST07										Note 1
Mold Making #1	EU33	ST09										Note 1
Mold Making #2	EU34	ST09										Note 1
Core Silica Sand Silo A	EU35A	ST09										Note 2
Core Silica Sand Silo B	EU35B	ST09										Note 2
Core Sand Handling and Preparation	EU36	ST09										Note 1
PUCB Core Machine #1(Resin and Catalyst)	EU39	ST08						0.986				Note 1
PUCB Core Machine #1 (Core Release)	EU39	ST08						3.570				
PUCB Core Machine #2(Resin and Catalyst)	EU40	ST08						*0.986*				Note 1
PUCB Core Machine #2 (Core Release)	EU40	ST08						*3.570*				
PUCB Core Machine #3(Resin and Catalyst)	EU41	ST08						*0.986*				Note 1
PUCB Core Machine #3 (Core Release)	EU41	ST08						*3.570*				
PUCB Core Machine #4(Resin and Catalyst)	EU42	ST08						0.986				Note 1
PUCB Core Machine #4 (Core Release)	EU42	ST08						3.570				
Core Wash Station #1	EU43	ST09						*5.130*				Note 1
Core Dryer #1	EU44	ST09				*0.002*	*0.392*	*0.022*	*0.329*	*1.96E-06*	*471*	Note 1
Core Dryer #2	EU45	ST09				*0.002*	*0.392*	*0.022*	*0.329*	*1.96E-06*	*471*	Note 1
Core Dryer #3	EU46	ST09				*0.002*	*0.392*	*0.022*	*0.329*	*1.96E-06*	*471*	Note 1
Core Dryer #4	EU47	ST09				*0.002*	*0.392*	*0.022*	*0.329*	*1.96E-06*	*471*	Note 1
Pouring #1	EU50	ST09				*0.253*	*0.127*	*6.325*	*63.250*	*0.006*		Note 1
Pouring #2	EU51	ST09				*0.253*	*0.127*	*6.325*	*63.250*	*0.006*		Note 1
Mold Cooling	EU52	ST09										Note 1
Shakeout Conveyor	EU53	ST07						*13.358*	*25.300*			Note 1
Sand Plant Waste Sand Silo	EU57	ST11										Note 1
Casting Cooling	EU59	ST09										Note 1
Sorting Conveyor	EU60	ST12										Note 1
Steel Shot Blasting #1	EU61	ST12										Note 1
Steel Shot Blasting #2	EU62	ST12										Note 1
Fettling Baghouse Waste Dust Silo	EU63	ST13										Note 1
Auto Grinding #1	EU64	ST12										Note 1
Auto Grinding #2	EU65	ST12										Note 1
Machining Lines (9)	EU66	ST16										Note 2
Perforation Line (1)	EU67	ST16										Note 2
Paint Line #3 (Coating)	EU68	ST15A						*0.748*				Note 1
Paint Line #3 (Thinner)	EU68	ST15A						*1.470*				
Paint Line #2(Coating)	EU69	ST15B						*0.748*				Note 1
Paint Line #2(Thinner)	EU69	ST15B						*1.470*				
Paint Line #1	EU71	ST16						*0.513*				Note 1
Emergency Generator #1	EU72	STG1	*1.05E-02*	*1.05E-02*	*1.05E-02*	*2.27E-01*	*4.80E-01*	*1.35E-02*	*1.28E-01*		*2.48E+01*	
Emergency Generator #2	EU73	STG2	*1.05E-02*	*1.05E-02*	*1.05E-02*	*2.28E-01*	*4.80E-01*	*1.35E-02*	*1.28E-01*		*2.48E+01*	
Emergency Generator #3	EU74	STG3				*2.32E-03*	*3.53E-02*	*2.80E-03*	*7.60E-03*		*1.31E+00*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Snag Grinder #1	EU77	ST12										Note 2
Snag Grinder #2	EU78	ST12										Note 2
Core Wash Station #2	EU79	ST09						*5.130*				
Core Wash Station #3	EU80	ST09						*5.130*				
Core Wash Station #4	EU81	ST09						*5.130*				
Rust Prohibitive Application	EU82	ST16						*2.500*				
Total Emissions			**0.02**	**0.02**	**0.02**	**0.99**	**5.25**	**77.09**	**175.42**	**0.01**	**4853.16**	
Melt Baghouse (CU01)	CU01	ST02	2.643	2.643	2.643	0.015	2.433	3.854	22.044	0.000	2920.000	
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)	CU02	ST03	0.015	0.015	0.015							
Mold Silica Sand Silo Bin Vent Filter (CU03)	CU03	ST04	0.015	0.015	0.015							
Blend Silo Bin Vent Filter (CU04)	CU04	ST05	0.015	0.015	0.015							
Bentonite Silo Bin Vent Filter (CU05)	CU05	ST06	0.015	0.015	0.015							
Sand Plant Baghouse (CU06)	CU06	ST07	2.208	2.208	2.208			13.358	25.300			
Acid Scrubber (CU07)	CU07	ST08	0.065	0.065	0.065			18.223				
Core/Mold Baghouse (CU08)	CU08	ST09	1.900	1.900	1.900	0.515	1.822	33.256	127.818	0.012	1882.353	
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)	CU10	ST11	0.015	0.015	0.015							
Fettling Baghouse (CU11)	CU11	ST12	0.573	0.573	0.573							
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)	CU12	ST13	0.015	0.015	0.015							
Machining Cartridge Collectors (CU13a-h)	CU13a-h	ST16	0.101	0.101	0.101							Note 2
Machining Cartridge Collectors (CU13i-j)	CU13i-j	ST16	0.101	0.101	0.101							Note 2
Paint Line #3 Booth Filter (CU14)	CU14	ST15A	0.023	0.023	0.023			2.218				
Paint Line #2 Booth Filter (CU15)	CU15	ST15B	0.023	0.023	0.023			2.218				
Paint Line #1 Booth Filter (CU17)	CU17	ST16	0.259	0.259	0.259			3.013				
Core Silica Sand Silo A Bin Vent Filter (CU19)	CU19	ST09	0.015	0.015	0.015							Note 2
Core Silica Sand Silo B Bin Vent Filter (CU20)	CU20	ST09	0.015	0.015	0.015							Note 2
Snag Grinder #1 Fabric Filter (CU21)	CU21	ST12	0.039	0.039	0.039							Note 2
Snag Grinder #2 Fabric Filter (CU22)	CU22	ST12	0.039	0.039	0.039							Note 2
Emergency Generator #1	EU72	STG1	1.05E-02	*1.05E-02*	*1.05E-02*	*0.227*	*0.480*	*0.014*	*0.128*		*24.750*	
Emergency Generator #2	EU73	STG2	1.05E-02	*1.05E-02*	*1.05E-02*	*0.228*	*0.480*	*0.014*	*0.128*		*24.750*	
Emergency Generator #3	EU74	STG3				*0.002*	*0.035*	*0.003*	*0.008*		*1.312*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Total Emissions			**7.83**	**7.83**	**7.83**	**0.99**	**5.25**	**77.09**	**175.42**	**0.01**	**4853.16**	Note 3

Note 1: PM, PM_{10} and $PM_{2.5}$ emissions are included in the emissions from the identified air pollution control device.

Note 2: Emissions from this air pollution control device are emitted inside the facility and subsequently captured via a second air pollution control device. Emissions are included in the project total as a portion of the emissions from the second control device.

Note 3: Total particulate emissons do not include the emissions from the emergency generators.

Annual Criteria Pollutant Emission Summary
Fritz Winter North
America, LP
Franklin, Kentucky

PROCESS	EU ID	Stack ID	Emissions Estimates - PSD Regulated Pollutants (Tons/Year) PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO2e	
Charge Handling	EU01	ST02										Note 1
Refractory Burner #1	EU05	ST02				0.022	3.650	0.201	3.066	1.83E-05	4,380	Note 1
Refractory Burner #2	EU06	ST02				0.022	3.650	0.201	3.066	1.83E-05	4,380	Note 1
Induction Furnace #1	EU07	ST02						1.065	5.724			Note 1
Induction Furnace #2	EU08	ST02						1.065	5.724			Note 1
Induction Furnace #3	EU09	ST02						1.065	5.724			Note 1
Induction Furnace #4	EU10	ST02						1.065	5.724			Note 1
Hot Metal Transfer	EU13	ST02										Note 1
Pouring Furnace #1	EU15	ST02				*0.007*	*1.250*	*0.069*	*1.050*	*6.25E-06*	*1,500*	Note 1
Pouring Furnace #2	EU16	ST02				*0.007*	*1.250*	*0.069*	*1.050*	*6.25E-06*	*1,500*	Note 1
Melt Baghouse Dust Silo	EU17	ST03										Note 1
Refractory Curing Mobile Burner	EU18	ST02				*0.005*	*0.859*	*0.047*	*0.721*	*4.29E-06*	*1,031*	Note 1
Mold Silica Sand Silo	EU19	ST04										Note 1
Blend Silo	EU20	ST05										Note 1
Bentonite Silo	EU21	ST06										Note 1
Mold Sand Handling and Preparation	EU22	ST07										Note 1
Mold Making #1	EU33	ST09										Note 1
Mold Making #2	EU34	ST09										Note 1
Core Silica Sand Silo A	EU35A	ST09										Note 1
Core Silica Sand Silo B	EU35B	ST09										Note 1
Core Sand Handling and Preparation	EU36	ST09										Note 1
PUCB Core Machine #1(Resin and Catalyst)	EU39	ST08						1.782				Note 1
PUCB Core Machine #1 (Core Release)	EU39	ST08						6.545				
PUCB Core Machine #2(Resin and Catalyst)	EU40	ST08						*1.782*				Note 1
PUCB Core Machine #2 (Core Release)	EU40	ST08						*6.545*				
PUCB Core Machine #3(Resin and Catalyst)	EU41	ST08						*1.782*				Note 1
PUCB Core Machine #3 (Core Release)	EU41	ST08						*6.545*				
PUCB Core Machine #4(Resin and Catalyst)	EU42	ST08						1.782				Note 1
PUCB Core Machine #4 (Core Release)	EU42	ST08						6.545				Note 1
Core Wash Station #1	EU43	ST09						*1.026*				Note 1
Core Dryer #1	EU44	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2,061*	Note 1
Core Dryer #2	EU45	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2,061*	Note 1
Core Dryer #3	EU46	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2,061*	Note 1
Core Dryer #4	EU47	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2,061*	Note 1
Pouring #1	EU50	ST09				*0.458*	*0.229*	*11.448*	*114.483*	*0.011*		Note 1
Pouring #2	EU51	ST09				*0.458*	*0.229*	*11.448*	*114.483*	*0.011*		Note 1
Mold Cooling	EU52	ST09										Note 1
Shakeout Conveyor	EU53	ST07						*24.179*	*45.793*			Note 1
Sand Plant Waste Sand Silo	EU57	ST11										Note 1
Casting Cooling	EU59	ST09										Note 1
Sorting Conveyor	EU60	ST12										Note 1
Steel Shot Blasting #1	EU61	ST12										Note 1
Steel Shot Blasting #2	EU62	ST12										Note 1
Fettling Baghouse Waste Dust Silo	EU63	ST13										Note 1
Auto Grinding #1	EU64	ST12										Note 1
Auto Grinding #2	EU65	ST12										Note 1
Machining Lines (9)	EU66	ST16										Note 2
Perforation Line (1)	EU67	ST16										Note 2
Paint Line #3 (Coating)	EU68	ST15A						3.274				Note 1
Paint Line #3 (Thinner)	EU68	ST15A						6.439				
Paint Line #2(Coating)	EU69	ST15B						*3.274*				Note 1
Paint Line #2(Thinner)	EU69	ST15B						*6.439*				
Paint Line #1	EU71	ST16						*2.244*				Note 1
Emergency Generator #1	EU72	STG1	*5.23E-04*	*5.23E-04*	*5.23E-04*	*1.14E-02*	*2.40E-02*	*6.75E-04*	*6.38E-03*		*1.24E+00*	
Emergency Generator #2	EU73	STG2	*5.23E-04*	*5.23E-04*	*5.23E-04*	*1.14E-02*	*2.40E-02*	*6.75E-04*	*6.38E-03*		*1.24E+00*	
Emergency Generator #3	EU74	STG3				*1.16E-04*	*1.76E-03*	*1.40E-04*	*3.80E-04*		*6.56E-02*	
Diesel Storage Tank	EU75	STTK1						*0.069*				
Snag Grinder #1	EU77	ST12										Note 2
Snag Grinder #2	EU78	ST12										Note 2
Core Wash Station #2	EU79	ST09						*1.026*				
Core Wash Station #3	EU80	ST09						*1.026*				
Core Wash Station #4	EU81	ST09						*1.026*				
Rust Prohibitive Application	EU82	ST16						*1.000*				
Total Emissions			**0.00**	**0.00**	**0.00**	**1.04**	**18.04**	**112.45**	**312.39**	**0.02**	**21036.85**	
Melt Baghouse (CU01)	CU01	ST02	*11.577*	*11.577*	*11.577*	*0.064*	*10.658*	*4.845*	*31.849*	*0.000*	*12789.600*	
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)	CU02	ST03	*0.068*	*0.068*	*0.068*							
Mold Silica Sand Silo Bin Vent Filter (CU03)	CU03	ST04	*0.0010*	*0.0010*	*0.0010*							
Blend Silo Bin Vent Filter (CU04)	CU04	ST05	*0.0010*	*0.0010*	*0.0010*							
Bentonite Silo Bin Vent Filter (CU05)	CU05	ST06	*0.0010*	*0.0010*	*0.0010*							
Sand Plant Baghouse (CU06)	CU06	ST07	*9.673*	*9.673*	*9.673*			*24.179*	*45.793*			
Acid Scrubber (CU07)	CU07	ST08	*0.283*	*0.283*	*0.283*			*33.309*				
Core/Mold Baghouse (CU08)	CU08	ST09	*8.321*	*8.321*	*8.321*	*0.957*	*7.329*	*27.378*	*234.736*	*0.022*	*8244.706*	
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)	CU10	ST11	*0.068*	*0.068*	*0.068*							
Fettling Baghouse (CU11)	CU11	ST12	*2.511*	*2.511*	*2.511*							
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)	CU12	ST13	*0.068*	*0.068*	*0.068*							
Machining Cartridge Collectors (CU13a-h)	CU13a-h	ST16	*0.443*	*0.443*	*0.443*							Note 2
Machining Cartridge Collectors (CU13i-j)	CU13i-j	ST16	*0.443*	*0.443*	*0.443*							Note 2
Paint Line #3 Booth Filter (CU14)	CU14	ST15A	*0.101*	*0.101*	*0.101*			*9.713*				
Paint Line #2 Booth Filter (CU15)	CU15	ST15B	*0.101*	*0.101*	*0.101*			*9.713*				
Paint Line #1 Booth Filter (CU17)	CU17	ST16	*1.133*	*1.133*	*1.133*			*3.244*				
Core Silica Sand Silo A Bin Vent Filter (CU19)	CU19	ST09	*0.001*	*0.001*	*0.001*							Note 2
Core Silica Sand Silo B Bin Vent Filter (CU20)	CU20	ST09	*0.001*	*0.001*	*0.001*							Note 2
Snag Grinder #1 Fabric Filter (CU21)	CU21	ST12	*0.170*	*0.170*	*0.170*							Note 2
Snag Grinder #2 Fabric Filter (CU22)	CU22	ST12	*0.170*	*0.170*	*0.170*							Note 2
Emergency Generator #1	EU72	STG1	*5.23E-04*	*5.23E-04*	*5.23E-04*	*0.011*	*0.024*	*0.001*	*0.006*		*1.238*	
Emergency Generator #2	EU73	STG2	*5.23E-04*	*5.23E-04*	*5.23E-04*	*0.011*	*0.024*	*0.001*	*0.006*		*1.238*	
Emergency Generator #3	EU74	STG3				*0.000*	*0.002*	*0.000*	*0.000*		*0.066*	
Diesel Storage Tank	EU75	STTK1						*0.069*				
Total Emissions			**33.91**	**33.91**	**33.91**	**1.04**	**18.04**	**112.45**	**312.39**	**0.02**	**21036.85**	Note 3

Note 1: PM, PM_{10} and $PM_{2.5}$ emissions are included in the emissions from the identified air pollution control device.

Note 2: Emissions from this air pollution control device are emitted inside the facility and subsequently captured via a second air pollution control device. Emissions are included in the project total as a portion of the emissions from the second control device.

Note 3: Total particulate emissons do not include the emissions from the emergency generators.

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Charge Handling
EU01

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Charge Handling
Control Device: Melt Baghouse (CU01) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Charge Handling										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		0.07	0.07	0.06						
(source)		Note 1	Note 1	Note 2						
Capture Efficiencies:		100.00	100.00	100.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Gutow Article, Modern Casting; January 1972; PM emissions from Raw material handling (0.04 lbs/ton) and charge makeup (0.03 lbs/ton) released to the atmosphere. All PM emission were conservatively assumed to be PM-10 emissions.
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to $PM_{2.5}$ ratio and uncontrolled PM emission factor.
Note 3: The Alloy Storage emission unit (EU02) is included in this emission unit.
Note 4: Secondary capture of fugitive emissions per testing conducted pursuant to permit term EG01,3.I

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Charge Handling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Refractory Burner #1
EU05
Process Description:
Refractory Burner #1
Control Device: **Melt Baghouse (CU01)** Note 4

Natural Gas Combustion

Inputs

8.5	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
8333.3	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
73	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	(tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.83	3.65	
CO	n/a	84.0	0.70	3.07	
Lead	n/a	0.0005	4.17E-06	1.83E-05	
SO2	n/a	0.6	0.01	0.02	
VOC	n/a	5.5	0.05	0.20	
CO_2e	n/a	120,000	1000.00	4380.00	
Arsenic (As)	7440-38-2	2.00E-04	1.67E-06	7.30E-06	
Beryllium (Be)	7440-41-7	1.20E-05	1.00E-07	4.38E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	9.17E-06	4.02E-05	
Chromium (Cr)	7440-47-3	1.40E-03	1.17E-05	5.11E-05	
Cobalt (Co)	7440-48-4	8.40E-05	7.00E-07	3.07E-06	
Lead (Pb)	7439-92-1	5.00E-04	4.17E-06	1.83E-05	
Manganese (Mn)	7439-96-5	3.80E-04	3.17E-06	1.39E-05	
Mercury (Hg)	7439-97-6	2.60E-04	2.17E-06	9.49E-06	
Nickel (Ni)	7440-02-0	2.10E-03	1.75E-05	7.67E-05	
Selenium (Se)	7782-49-2	2.40E-05	2.00E-07	8.76E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	2.00E-07	8.76E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	1.50E-08	6.57E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	1.33E-07	5.84E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	2.00E-08	8.76E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Benzene	71-43-2	2.10E-03	1.75E-05	7.67E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	1.00E-08	4.38E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	1.00E-08	4.38E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	1.00E-08	4.38E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	1.00E-05	4.38E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	2.50E-08	1.10E-07	Note 3
Fluorene (POM)	86-73-7	2.80E-06	2.33E-08	1.02E-07	Note 3
Formaldehyde	50-00-0	7.50E-02	6.25E-04	2.74E-03	
Hexane	110-54-3	1.80E+00	1.50E-02	6.57E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	5.08E-06	2.23E-05	
Phenanathrene (POM)	85-01-8	1.70E-05	1.42E-07	6.21E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	4.17E-08	1.83E-07	Note 3
Toluene	108-88-3	3.40E-03	2.83E-05	1.24E-04	
Total POM			7.35E-07	3.22E-06	
Total HAPs			1.57E-02	6.89E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.l)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Refractory Burner #2
EU06
Process Description:
Refractory Burner #2
Control Device: **Melt Baghouse (CU01)** Note 4

Natural Gas Combustion

Inputs

8.5	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
8333.3	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
73	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.83	3.65	
CO	n/a	84.0	0.70	3.07	
Lead	n/a	0.0005	4.17E-06	1.83E-05	
SO2	n/a	0.6	0.01	0.02	
VOC	n/a	5.5	0.05	0.20	
CO_2e	n/a	120,000	1000.00	4380.00	
Arsenic (As)	7440-38-2	2.00E-04	1.67E-06	7.30E-06	
Beryllium (Be)	7440-41-7	1.20E-05	1.00E-07	4.38E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	9.17E-06	4.02E-05	
Chromium (Cr)	7440-47-3	1.40E-03	1.17E-05	5.11E-05	
Cobalt (Co)	7440-48-4	8.40E-05	7.00E-07	3.07E-06	
Lead (Pb)	7439-92-1	5.00E-04	4.17E-06	1.83E-05	
Manganese (Mn)	7439-96-5	3.80E-04	3.17E-06	1.39E-05	
Mercury (Hg)	7439-97-6	2.60E-04	2.17E-06	9.49E-06	
Nickel (Ni)	7440-02-0	2.10E-03	1.75E-05	7.67E-05	
Selenium (Se)	7782-49-2	2.40E-05	2.00E-07	8.76E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	2.00E-07	8.76E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	1.50E-08	6.57E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	1.33E-07	5.84E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	2.00E-08	8.76E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Benzene	71-43-2	2.10E-03	1.75E-05	7.67E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	1.00E-08	4.38E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	1.00E-08	4.38E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	1.00E-08	4.38E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	1.00E-05	4.38E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	2.50E-08	1.10E-07	Note 3
Fluorene (POM)	86-73-7	2.80E-06	2.33E-08	1.02E-07	Note 3
Formaldehyde	50-00-0	7.50E-02	6.25E-04	2.74E-03	
Hexane	110-54-3	1.80E+00	1.50E-02	6.57E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	5.08E-06	2.23E-05	
Phenanathrene (POM)	85-01-8	1.70E-05	1.42E-07	6.21E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	4.17E-08	1.83E-07	Note 3
Toluene	108-88-3	3.40E-03	2.83E-05	1.24E-04	
Total POM			7.35E-07	3.22E-06	
Total HAPs			1.57E-02	6.89E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.l)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
22,897 Tons/Year

Flow Diagram Designation
Induction Furnace #1
EU07

Maximum Hourly Capacity
10.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Induction Furnace #1
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Induction Furnace #1										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.09	0.50		
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
Capture Efficiency		100.00	100.00	100.00			100.00	100.00		
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions					0.930	5.000		
Annual (TPY)							**1.065**	**5.724**		
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							0.930	5.000		
Annual (TPY)							**1.065**	**5.724**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: March 2020 compliance test
Note 4: See below HAPs calculations
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
22,897 Tons/Year

Flow Diagram Designation
Induction Furnace #2
EU08

Maximum Hourly Capacity
10.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Induction Furnace #2
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Induction Furnace #2										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.09	0.50		
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
Capture Efficiency		100.00	100.00	100.00			100.00	100.00		
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions					0.930	5.000		
Annual (TPY)							**1.065**	**5.724**		
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							0.930	5.000		
Annual (TPY)							**1.065**	**5.724**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: March 2020 compliance test
Note 4: See below HAPs calculations
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
22,897 Tons/Year

Flow Diagram Designation
Induction Furnace #3
EU09

Maximum Hourly Capacity
10.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Induction Furnace #3
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Induction Furnace #3										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.09	0.50		
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
Capture Efficiency		100.00	100.00	100.00			100.00	100.00		
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions					0.930	5.000		
Annual (TPY)							**1.065**	**5.724**		
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							0.930	5.000		
Annual (TPY)							**1.065**	**5.724**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: March 2020 compliance test
Note 4: See below HAPs calculations
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #3

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
22,897 Tons/Year

Flow Diagram Designation
Induction Furnace #4
EU10

Maximum Hourly Capacity
10.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Induction Furnace #4
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Induction Furnace #4										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.09	0.50		
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
Capture Efficiency		100.00	100.00	100.00			100.00	100.00		
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions					0.930	5.000		
Annual (TPY)							**1.065**	**5.724**		
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							0.930	5.000		
Annual (TPY)							**1.065**	**5.724**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: March 2020 compliance test
Note 4: See below HAPs calculations
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #4

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Hot Metal Transfer
EU13

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Hot Metal Transfer
Control Device: Melt Baghouse (CU01) Note 3
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:	**Criteria Pollutants**								
Hot Metal Transfer									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	0.056	0.052	0.046						
(source)	Note 1	Note 2	Note 2						
Capture Efficiency	100.00	100.00	100.00						
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
Annual (TPY)									
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Hot metal transfer at building monitor. AP-42, Ch. 12-5, Table 12.5-1
Note 2: Emission factor based on USEPA PM Calculator $PM/PM_{10}/PM_{2.5}$ ratio and uncontrolled PM emission factor for SCC 30400320
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Hot Metal Transfer

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Pouring Furnace #1
EU15
Process Description:
Pouring Furnace #1
Control Device: **Melt Baghouse (CU01)** Note 4

Natural Gas Combustion

Inputs

2.91	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
2852.9	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
24.99	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.29	1.25	
CO	n/a	84.0	0.24	1.05	
Lead	n/a	0.0005	1.43E-06	6.25E-06	
SO2	n/a	0.6	0.00	0.01	
VOC	n/a	5.5	0.02	0.07	
CO_2e	n/a	120,000	342.35	1499.51	
Arsenic (As)	7440-38-2	2.00E-04	5.71E-07	2.50E-06	
Beryllium (Be)	7440-41-7	1.20E-05	3.42E-08	1.50E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	3.14E-06	1.37E-05	
Chromium (Cr)	7440-47-3	1.40E-03	3.99E-06	1.75E-05	
Cobalt (Co)	7440-48-4	8.40E-05	2.40E-07	1.05E-06	
Lead (Pb)	7439-92-1	5.00E-04	1.43E-06	6.25E-06	
Manganese (Mn)	7439-96-5	3.80E-04	1.08E-06	4.75E-06	
Mercury (Hg)	7439-97-6	2.60E-04	7.42E-07	3.25E-06	
Nickel (Ni)	7440-02-0	2.10E-03	5.99E-06	2.62E-05	
Selenium (Se)	7782-49-2	2.40E-05	6.85E-08	3.00E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	6.85E-08	3.00E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	5.14E-09	2.25E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	4.56E-08	2.00E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	6.85E-09	3.00E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Benzene	71-43-2	2.10E-03	5.99E-06	2.62E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	3.42E-09	1.50E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	3.42E-09	1.50E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	3.42E-09	1.50E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	3.42E-06	1.50E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	8.56E-09	3.75E-08	Note 3
Fluorene (POM)	86-73-7	2.80E-06	7.99E-09	3.50E-08	Note 3
Formaldehyde	50-00-0	7.50E-02	2.14E-04	9.37E-04	
Hexane	110-54-3	1.80E+00	5.14E-03	2.25E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	1.74E-06	7.62E-06	
Phenanathrene (POM)	85-01-8	1.70E-05	4.85E-08	2.12E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	1.43E-08	6.25E-08	Note 3
Toluene	108-88-3	3.40E-03	9.70E-06	4.25E-05	
Total POM			2.52E-07	1.10E-06	
Total HAPs			5.39E-03	2.36E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Pouring Furnace #2
EU16
Process Description:
Pouring Furnace #2
Control Device: **Melt Baghouse (CU01)** Note 4

Natural Gas Combustion

Inputs

2.91	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
2852.9	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
24.99	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.29	1.25	
CO	n/a	84.0	0.24	1.05	
Lead	n/a	0.0005	1.43E-06	6.25E-06	
SO2	n/a	0.6	0.00	0.01	
VOC	n/a	5.5	0.02	0.07	
CO_2e	n/a	120,000	342.35	1499.51	
Arsenic (As)	7440-38-2	2.00E-04	5.71E-07	2.50E-06	
Beryllium (Be)	7440-41-7	1.20E-05	3.42E-08	1.50E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	3.14E-06	1.37E-05	
Chromium (Cr)	7440-47-3	1.40E-03	3.99E-06	1.75E-05	
Cobalt (Co)	7440-48-4	8.40E-05	2.40E-07	1.05E-06	
Lead (Pb)	7439-92-1	5.00E-04	1.43E-06	6.25E-06	
Manganese (Mn)	7439-96-5	3.80E-04	1.08E-06	4.75E-06	
Mercury (Hg)	7439-97-6	2.60E-04	7.42E-07	3.25E-06	
Nickel (Ni)	7440-02-0	2.10E-03	5.99E-06	2.62E-05	
Selenium (Se)	7782-49-2	2.40E-05	6.85E-08	3.00E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	6.85E-08	3.00E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	5.14E-09	2.25E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	4.56E-08	2.00E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	6.85E-09	3.00E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Benzene	71-43-2	2.10E-03	5.99E-06	2.62E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	3.42E-09	1.50E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	3.42E-09	1.50E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	3.42E-09	1.50E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	3.42E-06	1.50E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	8.56E-09	3.75E-08	Note 3
Fluorene (POM)	86-73-7	2.80E-06	7.99E-09	3.50E-08	Note 3
Formaldehyde	50-00-0	7.50E-02	2.14E-04	9.37E-04	
Hexane	110-54-3	1.80E+00	5.14E-03	2.25E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	1.74E-06	7.62E-06	
Phenanathrene (POM)	85-01-8	1.70E-05	4.85E-08	2.12E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	1.43E-08	6.25E-08	Note 3
Toluene	108-88-3	3.40E-03	9.70E-06	4.25E-05	
Total POM			2.52E-07	1.10E-06	
Total HAPs			5.39E-03	2.36E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Melt Baghouse Dust Silo
EU17

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Melt Baghouse Dust Silo
Control Device: Melt and Core/Mold BHs Dust Silo Bin Vent Filter (CU02)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	Melt Baghouse Dust Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Melt Baghouse Dust Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Refractory Curing Mobile Burner
EU18
Process Description:
Refractory Curing Mobile Burner
Control Device: **Melt Baghouse (CU01)** Note 4

Natural Gas Combustion

Inputs

2.00	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
1960.8	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
17.18	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.20	0.86	
CO	n/a	84.0	0.16	0.72	
Lead	n/a	0.0005	9.80E-07	4.29E-06	
SO2	n/a	0.6	0.00	0.01	
VOC	n/a	5.5	0.01	0.05	
CO_2e	n/a	120,000	235.29	1030.59	
Arsenic (As)	7440-38-2	2.00E-04	3.92E-07	1.72E-06	
Beryllium (Be)	7440-41-7	1.20E-05	2.35E-08	1.03E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	2.16E-06	9.45E-06	
Chromium (Cr)	7440-47-3	1.40E-03	2.75E-06	1.20E-05	
Cobalt (Co)	7440-48-4	8.40E-05	1.65E-07	7.21E-07	
Lead (Pb)	7439-92-1	5.00E-04	9.80E-07	4.29E-06	
Manganese (Mn)	7439-96-5	3.80E-04	7.45E-07	3.26E-06	
Mercury (Hg)	7439-97-6	2.60E-04	5.10E-07	2.23E-06	
Nickel (Ni)	7440-02-0	2.10E-03	4.12E-06	1.80E-05	
Selenium (Se)	7782-49-2	2.40E-05	4.71E-08	2.06E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	4.71E-08	2.06E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	3.53E-09	1.55E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	3.14E-08	1.37E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	3.53E-09	1.55E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	3.53E-09	1.55E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	4.71E-09	2.06E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	3.53E-09	1.55E-08	Note 2,3
Benzene	71-43-2	2.10E-03	4.12E-06	1.80E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	2.35E-09	1.03E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	3.53E-09	1.55E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	2.35E-09	1.03E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	3.53E-09	1.55E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	3.53E-09	1.55E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	2.35E-09	1.03E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	2.35E-06	1.03E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	5.88E-09	2.58E-08	Note 3
Fluorene (POM)	86-73-7	2.80E-06	5.49E-09	2.40E-08	Note 3
Formaldehyde	50-00-0	7.50E-02	1.47E-04	6.44E-04	
Hexane	110-54-3	1.80E+00	3.53E-03	1.55E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	3.53E-09	1.55E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	1.20E-06	5.24E-06	
Phenanathrene (POM)	85-01-8	1.70E-05	3.33E-08	1.46E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	9.80E-09	4.29E-08	Note 3
Toluene	108-88-3	3.40E-03	6.67E-06	2.92E-05	
Total POM			1.73E-07	7.57E-07	
Total HAPs			3.70E-03	1.62E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Mold Silica Sand Silo
EU19

Maximum Hourly Capacity
25.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Mold Silica Sand Silo
Control Device: Mold Silica Sand Silo Bin Vent Filter (CU03)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
Mold Silica Sand Silo										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Silica Sand Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
4,179 Tons/Year

Flow Diagram Designation
Blend Silo
EU20

Maximum Hourly Capacity
25.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Blend Silo
Control Device: Blend Silo Bin Vent Filter (CU04)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
Blend Silo										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Blend Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
595 Tons/Year

Flow Diagram Designation
Bentonite Silo
EU21

Maximum Hourly Capacity
25.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Bentonite Silo
Control Device: Bentonite Silo Bin Vent Filter (CU05)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
Bentonite Silo										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Bentonite Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
716,760 Tons/Year

Flow Diagram Designation
Mold Sand Handling and Preparation
EU22

Maximum Hourly Capacity
198.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Mold Sand Handling and Preparation

Control Device: Sand Plant Baghouse (CU06) Note 3
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:			**Criteria Pollutants**								
	Mold Sand Handling and Preparation										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	3.60	0.54	0.54						
(source)			Note 1	Note 1	Note 2						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-50
Note 2: Assumes PM2.5 is equal to PM10
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Sand Handling and Preparation

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Annual Actual Throughput
45,793 Tons/Year

Flow Diagram Designation
Mold Making #1
EU33

Hourly Actual Throughput
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Mold Making #1
Control Device: Core/Mold Baghouse (CU08) Note 3
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Mold Making #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			0.04	0.04	0.04						
(source)			Note 1	Note 2	Note 2			Note 4			
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio RACM, Table 2.7-1
Note 2: PM_{10} and $PM_{2.5}$ assumed equal to PM.
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 4: Emissions from mold release (Zip-Slip LR57HP) quantified with pouring, cooling and shakeout

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Making #1

100.00

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Annual Actual Throughput
45,793 Tons/Year

Flow Diagram Designation
Mold Making #2
EU34

Hourly Actual Throughput
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Mold Making #2
Control Device: Core/Mold Baghouse (CU08) Note 3
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Mold Making #2										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		0.04	0.04	0.04						
(source)		Note 1	Note 2	Note 2			Note 4			
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio RACM, Table 2.7-1
Note 2: PM_{10} and $PM_{2.5}$ assumed equal to PM.
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 4: Emissions from mold release (Zip-Slip LR57HP) quantified with pouring, cooling and shakeout

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Making #2

HAP Capture Efficiency: 100.00
Metal HAP Control Efficiency:

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
6,690 Tons/Year

Flow Diagram Designation
Core Silica Sand Silo A
EU35A

Maximum Hourly Capacity
25.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Core Silica Sand Silo A
Control Device: Core Silica Sand Silo A Bin Vent Filter (CU19)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	Core Silica Sand Silo A									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Silica Sand Silo A

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
6,690 Tons/Year

Flow Diagram Designation
Core Silica Sand Silo B
EU35B

Maximum Hourly Capacity
25.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Core Silica Sand Silo B
Control Device: Core Silica Sand Silo B Bin Vent Filter (CU20)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	Core Silica Sand Silo B									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-40
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Silica Sand Silo B

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
13,380 Tons/Year

Flow Diagram Designation
Core Sand Handling and Preparation
EU36

Maximum Hourly Capacity
3.70 Tons/Hour

Process Description:
Fritz Winter North America, LP
Core Sand Handling and Preparation
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:			**Criteria Pollutants**								
	Core Sand Handling and Preparation										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.65	0.54	0.54						
(source)			Note 1	Note 2	Note 3						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AIRS Facility Subsystem SCC and EF Listing (EPA 450/4-90-003, March 1990)
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-50
Note 3: Assumes PM2.5 is equal to PM10

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Sand Handling and Preparation

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
3,345 Tons/Year

Flow Diagram Designation
PUCB Core Machine #1(Resin and Catalyst)
EU39

Maximum Hourly Sand Capacity
0.93 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #1(Resin and Catalyst)
Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #1(Resin and Catalyst)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton sand	0.65	0.65	0.65			1.066			
(source)		Note 1	Note 1	Note 1			Note 2			
	Capture Efficiency	100.00	100.00	100.00			100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions					0.986			
	Annual (TPY)						**1.782**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						0.986			
	Annual (TPY)						**1.782**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 2: OCMA VOC Study (0.65 lb/ton sand); 1.25% resin (BOS); 10% catalyst (BOR); 98% scrubber efficiency for catalyst

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1(Resin and Catalyst)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	0.0034			3.15E-03	5.69E-03	**3.15E-03**	**5.69E-03**	Note 4
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0221			2.04E-02	3.70E-02	**2.04E-02**	**3.70E-02**	Note 4
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0138			1.28E-02	2.31E-02	**1.28E-02**	**2.31E-02**	Note 4
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
Total HAPs					3.64E-02	6.57E-02	3.64E-02	6.57E-02	

Note 4: CERP Report (Tecknikon #1409-123-EQ) December 2002, Table 3-2

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Core Release Capacity
7.7 Tons/Year

Flow Diagram Designation
PUCB Core Machine #1 (Core Release)
EU39

Maximum Hourly Core Release Capacity
0.0021 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #1 (Core Release)
Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #1 (Core Release)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton						1700.000			
(source)							Note 1,2			
	Capture Efficiency						100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ACMOS 118-63 Core Release (84% VOC by weight per SDS and 1/3/2022 email)
HA NIxStix CB/NB Fast Dry (85% VOC per J. Krause 1/3/2022 email)
Note 2: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1 (Core Release)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
3,345 Tons/Year

Flow Diagram Designation
PUCB Core Machine #2(Resin and Catalyst)
EU40

Maximum Hourly Sand Capacity
0.93 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #2(Resin and Catalyst)

Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #2(Resin and Catalyst)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton sand	0.65	0.65	0.65			1.066			
(source)		Note 1	Note 1	Note 1			Note 2			
	Capture Efficiency	100.00	100.00	100.00			100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions					0.986			
	Annual (TPY)						**1.782**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						0.986			
	Annual (TPY)						**1.782**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 2: OCMA VOC Study (0.65 lb/ton sand); 1.25% resin (BOS); 10% catalyst (BOR); 98% scrubber efficiency for catalyst

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #2(Resin and Catalyst)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	0.0034			3.15E-03	5.69E-03	**3.15E-03**	**5.69E-03**	Note 4
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0221			2.04E-02	3.70E-02	**2.04E-02**	**3.70E-02**	Note 4
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0138			1.28E-02	2.31E-02	**1.28E-02**	**2.31E-02**	Note 4
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
Total HAPs					3.64E-02	6.57E-02	3.64E-02	6.57E-02	

Note 4: CERP Report (Tecknikon #1409-123-EQ) December 2002, Table 3-2

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
7.7 Tons/Year

Flow Diagram Designation
PUCB Core Machine #2 (Core Release)
EU40

Maximum Hourly Sand Capacity
0.0021 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #2 (Core Release)
Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #2 (Core Release)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton						1700.000			
(source)							Note 1,2			
	Capture Efficiency						100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ACMOS 118-63 Core Release (84% VOC by weight per SDS and 1/3/2022 email)
HA NIxStix CB/NB Fast Dry (85% VOC per J. Krause 1/3/2022 email)
Note 2: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #2 (Core Release)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
3,345 Tons/Year

Flow Diagram Designation
PUCB Core Machine #3(Resin and Catalyst)
EU41

Maximum Hourly Sand Capacity
0.93 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #3(Resin and Catalyst)

Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #3(Resin and Catalyst)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton sand	0.65	0.65	0.65			1.066			
(source)		Note 1	Note 1	Note 1			Note 2			
	Capture Efficiency	100.00	100.00	100.00			100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions					0.986			
	Annual (TPY)						**1.782**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						0.986			
	Annual (TPY)						**1.782**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 2: OCMA VOC Study (0.65 lb/ton sand); 1.25% resin (BOS); 10% catalyst (BOR); 98% scrubber efficiency for catalyst

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #3(Resin and Catalyst)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	0.0034			3.15E-03	5.69E-03	**3.15E-03**	**5.69E-03**	Note 4
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0221			2.04E-02	3.70E-02	**2.04E-02**	**3.70E-02**	Note 4
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0138			1.28E-02	2.31E-02	**1.28E-02**	**2.31E-02**	Note 4
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
Total HAPs					3.64E-02	6.57E-02	3.64E-02	6.57E-02	

Note 4: CERP Report (Tecknikon #1409-123-EQ) December 2002, Table 3-2

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
7.7 Tons/Year

Flow Diagram Designation
PUCB Core Machine #3 (Core Release)
EU41

Maximum Hourly Sand Capacity
0.0021 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #3 (Core Release)
Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #3 (Core Release)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton						1700.000			
(source)							Note 1,2			
	Capture Efficiency						100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ACMOS 118-63 Core Release (84% VOC by weight per SDS and 1/3/2022 email)
HA NIxStix CB/NB Fast Dry (85% VOC per J. Krause 1/3/2022 email)
Note 2: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #3 (Core Release)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
3,345 Tons/Year

Flow Diagram Designation
PUCB Core Machine #4(Resin and Catalyst)
EU42

Maximum Hourly Sand Capacity
0.93 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #4(Resin and Catalyst)
Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #4(Resin and Catalyst)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton sand	0.65	0.65	0.65			1.066			
(source)		Note 1	Note 1	Note 1			Note 2			
	Capture Efficiency	100.00	100.00	100.00			100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions					0.986			
	Annual (TPY)						**1.782**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						0.986			
	Annual (TPY)						**1.782**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 2: OCMA VOC Study (0.65 lb/ton sand); 1.25% resin (BOS); 10% catalyst (BOR); 98% scrubber efficiency for catalyst

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #4(Resin and Catalyst)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	0.0034			3.15E-03	5.69E-03	**3.15E-03**	**5.69E-03**	Note 4
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0221			2.04E-02	3.70E-02	**2.04E-02**	**3.70E-02**	Note 4
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0138			1.28E-02	2.31E-02	**1.28E-02**	**2.31E-02**	Note 4
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
Total HAPs					3.64E-02	6.57E-02	3.64E-02	6.57E-02	

Note 4: CERP Report (Tecknikon #1409-123-EQ) December 2002, Table 3-2

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
7.7 Tons/Year

Flow Diagram Designation
PUCB Core Machine #4 (Core Release)
EU42

Maximum Hourly Sand Capacity
0.0021 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #4 (Core Release)
Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #4 (Core Release)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton						1700.000			
(source)							Note 1,2			
	Capture Efficiency						100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ACMOS 118-63 Core Release (84% VOC by weight per SDS and 1/3/2022 email)
HA NIxStix CB/NB Fast Dry (85% VOC per J. Krause 1/3/2022 email)
Note 2: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #4 (Core Release)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
135.0 Tons/Year Note 1

Flow Diagram Designation
Core Wash Station #1
EU43

Maximum Hourly Sand Capacity
0.338 Tons/Hour Note 1

Process Description:
Fritz Winter North America, LP
Core Wash Station #1

Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Core Wash Station #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						0.76%			
(source)							Note 2			
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							5.130			
Annual (TPY)							**1.026**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							5.130			
Annual (TPY)							**1.026**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Usage from original permit application
Note 2: VOC Content from original permit application; ASK rep indicated less than 0.1% VOC

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Wash Station #1

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Core Dryer #1
EU44
Process Description:
Core Dryer #1
Control Device: **Core/Mold Baghouse (CU08)** Note 4

Natural Gas Combustion

Inputs

4.0	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
3921.6	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
34.35294118	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.392	1.718	
CO	n/a	84.0	0.329	1.443	
Lead	n/a	0.0005	1.96E-06	8.59E-06	
SO2	n/a	0.6	0.002	0.010	
VOC	n/a	5.5	0.022	0.094	
CO_2e	n/a	120,000	470.588	2061.176	
Arsenic (As)	7440-38-2	2.00E-04	7.84E-07	3.44E-06	
Beryllium (Be)	7440-41-7	1.20E-05	4.71E-08	2.06E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	4.31E-06	1.89E-05	
Chromium (Cr)	7440-47-3	1.40E-03	5.49E-06	2.40E-05	
Cobalt (Co)	7440-48-4	8.40E-05	3.29E-07	1.44E-06	
Lead (Pb)	7439-92-1	5.00E-04	1.96E-06	8.59E-06	
Manganese (Mn)	7439-96-5	3.80E-04	1.49E-06	6.53E-06	
Mercury (Hg)	7439-97-6	2.60E-04	1.02E-06	4.47E-06	
Nickel (Ni)	7440-02-0	2.10E-03	8.24E-06	3.61E-05	
Selenium (Se)	7782-49-2	2.40E-05	9.41E-08	4.12E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	9.41E-08	4.12E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	6.27E-08	2.75E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	9.41E-09	4.12E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzene	71-43-2	2.10E-03	8.24E-06	3.61E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	4.71E-06	2.06E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	1.18E-08	5.15E-08	Note 3
Fluorene (POM)	86-73-7	2.80E-06	1.10E-08	4.81E-08	Note 3
Formaldehyde	50-00-0	7.50E-02	2.94E-04	1.29E-03	
Hexane	110-54-3	1.80E+00	7.06E-03	3.09E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	2.39E-06	1.05E-05	
Phenanathrene (POM)	85-01-8	1.70E-05	6.67E-08	2.92E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	1.96E-08	8.59E-08	Note 3
Toluene	108-88-3	3.40E-03	1.33E-05	5.84E-05	
Total POM			3.46E-07	1.51E-06	
Total HAPs			7.41E-03	3.24E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Core Dryer #2
EU45
Process Description:
Core Dryer #2
Control Device: **Core/Mold Baghouse (CU08)** Note 4

Natural Gas Combustion

Inputs

4.0	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
3921.6	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
34.35294118	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.392	1.718	
CO	n/a	84.0	0.329	1.443	
Lead	n/a	0.0005	1.96E-06	8.59E-06	
SO2	n/a	0.6	0.002	0.010	
VOC	n/a	5.5	0.022	0.094	
CO_2e	n/a	120,000	470.588	2061.176	
Arsenic (As)	7440-38-2	2.00E-04	7.84E-07	3.44E-06	
Beryllium (Be)	7440-41-7	1.20E-05	4.71E-08	2.06E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	4.31E-06	1.89E-05	
Chromium (Cr)	7440-47-3	1.40E-03	5.49E-06	2.40E-05	
Cobalt (Co)	7440-48-4	8.40E-05	3.29E-07	1.44E-06	
Lead (Pb)	7439-92-1	5.00E-04	1.96E-06	8.59E-06	
Manganese (Mn)	7439-96-5	3.80E-04	1.49E-06	6.53E-06	
Mercury (Hg)	7439-97-6	2.60E-04	1.02E-06	4.47E-06	
Nickel (Ni)	7440-02-0	2.10E-03	8.24E-06	3.61E-05	
Selenium (Se)	7782-49-2	2.40E-05	9.41E-08	4.12E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	9.41E-08	4.12E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	6.27E-08	2.75E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	9.41E-09	4.12E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzene	71-43-2	2.10E-03	8.24E-06	3.61E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	4.71E-06	2.06E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	1.18E-08	5.15E-08	Note 3
Fluorene (POM)	86-73-7	2.80E-06	1.10E-08	4.81E-08	Note 3
Formaldehyde	50-00-0	7.50E-02	2.94E-04	1.29E-03	
Hexane	110-54-3	1.80E+00	7.06E-03	3.09E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	2.39E-06	1.05E-05	
Phenanathrene (POM)	85-01-8	1.70E-05	6.67E-08	2.92E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	1.96E-08	8.59E-08	Note 3
Toluene	108-88-3	3.40E-03	1.33E-05	5.84E-05	
Total POM			3.46E-07	1.51E-06	
Total HAPs			7.41E-03	3.24E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Core Dryer #3
EU46
Process Description:
Core Dryer #3
Control Device: **Core/Mold Baghouse (CU08)** Note 4

Natural Gas Combustion

Inputs

4.0	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
3921.6	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
34.35294118	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.392	1.718	
CO	n/a	84.0	0.329	1.443	
Lead	n/a	0.0005	1.96E-06	8.59E-06	
SO2	n/a	0.6	0.002	0.010	
VOC	n/a	5.5	0.022	0.094	
CO_2e	n/a	120,000	470.588	2061.176	
Arsenic (As)	7440-38-2	2.00E-04	7.84E-07	3.44E-06	
Beryllium (Be)	7440-41-7	1.20E-05	4.71E-08	2.06E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	4.31E-06	1.89E-05	
Chromium (Cr)	7440-47-3	1.40E-03	5.49E-06	2.40E-05	
Cobalt (Co)	7440-48-4	8.40E-05	3.29E-07	1.44E-06	
Lead (Pb)	7439-92-1	5.00E-04	1.96E-06	8.59E-06	
Manganese (Mn)	7439-96-5	3.80E-04	1.49E-06	6.53E-06	
Mercury (Hg)	7439-97-6	2.60E-04	1.02E-06	4.47E-06	
Nickel (Ni)	7440-02-0	2.10E-03	8.24E-06	3.61E-05	
Selenium (Se)	7782-49-2	2.40E-05	9.41E-08	4.12E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	9.41E-08	4.12E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	6.27E-08	2.75E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	9.41E-09	4.12E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzene	71-43-2	2.10E-03	8.24E-06	3.61E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	4.71E-06	2.06E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	1.18E-08	5.15E-08	Note 3
Fluorene (POM)	86-73-7	2.80E-06	1.10E-08	4.81E-08	Note 3
Formaldehyde	50-00-0	7.50E-02	2.94E-04	1.29E-03	
Hexane	110-54-3	1.80E+00	7.06E-03	3.09E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	2.39E-06	1.05E-05	
Phenanathrene (POM)	85-01-8	1.70E-05	6.67E-08	2.92E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	1.96E-08	8.59E-08	Note 3
Toluene	108-88-3	3.40E-03	1.33E-05	5.84E-05	
Total POM			3.46E-07	1.51E-06	
Total HAPs			7.41E-03	3.24E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Core Dryer #4
EU47
Process Description:
Core Dryer #4
Control Device: **Core/Mold Baghouse (CU08)** Note 4

Natural Gas Combustion

Inputs

4.0	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
3921.6	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
34.35294118	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.392	1.718	
CO	n/a	84.0	0.329	1.443	
Lead	n/a	0.0005	1.96E-06	8.59E-06	
SO2	n/a	0.6	0.002	0.010	
VOC	n/a	5.5	0.022	0.094	
CO_2e	n/a	120,000	470.588	2061.176	
Arsenic (As)	7440-38-2	2.00E-04	7.84E-07	3.44E-06	
Beryllium (Be)	7440-41-7	1.20E-05	4.71E-08	2.06E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	4.31E-06	1.89E-05	
Chromium (Cr)	7440-47-3	1.40E-03	5.49E-06	2.40E-05	
Cobalt (Co)	7440-48-4	8.40E-05	3.29E-07	1.44E-06	
Lead (Pb)	7439-92-1	5.00E-04	1.96E-06	8.59E-06	
Manganese (Mn)	7439-96-5	3.80E-04	1.49E-06	6.53E-06	
Mercury (Hg)	7439-97-6	2.60E-04	1.02E-06	4.47E-06	
Nickel (Ni)	7440-02-0	2.10E-03	8.24E-06	3.61E-05	
Selenium (Se)	7782-49-2	2.40E-05	9.41E-08	4.12E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	9.41E-08	4.12E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	6.27E-08	2.75E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	9.41E-09	4.12E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzene	71-43-2	2.10E-03	8.24E-06	3.61E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	4.71E-06	2.06E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	1.18E-08	5.15E-08	Note 3
Fluorene (POM)	86-73-7	2.80E-06	1.10E-08	4.81E-08	Note 3
Formaldehyde	50-00-0	7.50E-02	2.94E-04	1.29E-03	
Hexane	110-54-3	1.80E+00	7.06E-03	3.09E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	2.39E-06	1.05E-05	
Phenanathrene (POM)	85-01-8	1.70E-05	6.67E-08	2.92E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	1.96E-08	8.59E-08	Note 3
Toluene	108-88-3	3.40E-03	1.33E-05	5.84E-05	
Total POM			3.46E-07	1.51E-06	
Total HAPs			7.41E-03	3.24E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Pouring #1
EU50

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Pouring #1
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Pouring #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.410	0.410	0.336	0.020	0.010	0.500	5.000	4.79E-04	
(source)			Note 1	Note 1	Note 5	Note 2	Note 2	Note 4	Note 4	Note 3	
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions			0.253	0.127	6.325	63.250	6.06E-03	
	Annual (TPY)					**0.458**	**0.229**	**11.448**	**114.483**	**1.10E-02**	
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)					0.253	0.127	6.325	63.250	6.06E-03	
	Annual (TPY)					**0.458**	**0.229**	**11.448**	**114.483**	**1.10E-02**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Stack test at Quality Castings, Orrville, OH.
Note 2: WebFIRE (Aug 20, 2021) SCC 30400320
Note 3: Emission factors taken from the document entitled "Foundry Process Emission Factors: Baseline Emissions from Automotive Foundries in Mexico"; (CERP-Mexico); Table 5.12
Note 4: FWNA Original Application/BACT, using Waupaca RBLC entries and air volumes
Note 5: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb /
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (
Maximum Stack Emissions Rate (lb/hr) {SOx,NOx, VOC, CO} =(Max. Rated Capa
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of ope
Maximum Annual (ton/yr) SOx NOx, VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Pouring #2
EU51

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Pouring #2
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Pouring #2										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.410	0.410	0.336	0.020	0.010	0.500	5.000	4.79E-04	
(source)			Note 1	Note 1	Note 4	Note 2	Note 2	Note 4	Note 4	Note 3	
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions			0.253	0.127	6.325	63.250	6.06E-03	
	Annual (TPY)					**0.458**	**0.229**	**11.448**	**114.483**	**1.10E-02**	
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)					0.253	0.127	6.325	63.250	6.06E-03	
	Annual (TPY)					**0.458**	**0.229**	**11.448**	**114.483**	**1.10E-02**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Stack test at Quality Castings, Orrville, OH.
Note 2: WebFIRE (Aug 20, 2021) SCC 30400320
Note 3: Emission factors taken from the document entitled "Foundry Process Emission Factors: Baseline Emissions from Automotive Foundries in Mexico"; (CERP-Mexico); Table 5.12
Note 4: FWNA Original Application/BACT, using Waupaca RBLC entries and air volumes
Note 5: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb /
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (
Maximum Stack Emissions Rate (lb/hr) {SOx,NOx, VOC, CO} =(Max. Rated Capa
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of ope
Maximum Annual (ton/yr) SOx NOx, VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Mold Cooling
EU52

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Mold Cooling
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Mold Cooling										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton									
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emissions are combined with pouring. See Pouring #1 (EU50) or Pouring #2 (EU51) worksheets.

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb /
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (
Maximum Stack Emissions Rate (lb/hr) {SOx,NOx, VOC, CO} =(Max. Rated Capa
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of ope
Maximum Annual (ton/yr) SOx NOx, VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Cooling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Shakeout Conveyor
EU53

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Shakeout Conveyor

Control Device: Sand Plant Baghouse (CU06)
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Shakeout Conveyor										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	3.20	2.24	1.34			0.528	1.000		
(source)			Note 1	Note 1	Note 1			Note 2	Note 2		
		Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions					13.358	25.300		
	Annual (TPY)							**24.179**	**45.793**		
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)							13.358	25.300		
	Annual (TPY)							**24.179**	**45.793**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: WebFire SCC 30400318 (4/15/2021)
Note 2: RBLC ID: WI-0429, East Jordan Foundry LLC, Permit Number 185-16, Permit date 04/27/2017
Note 3: RBLC ID: WI-0256, Waupaca Plant #2/#3, Permit Number 13-JJW-103, Permit date 12/18/2013

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Shakeout Conveyor

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Pouring Cooling Shakeout HAPs (Mold)
HAPs

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Pouring Cooling Shakeout HAPs (Mold)
Control Device: CU06 and CU08
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Pouring Cooling Shakeout HAPs (Mold)										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton									
(source)			Note 1,2								
		Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: See below for organic HAP emissions from pouring, cooling and shakeout
Note 2: Inorganic HAPs are quantified on the air pollution control device worksheet for CU06 and CU08

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring Cooling Shakeout HAPs (Mold)

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0	0.0045			0.1137	0.2057	0.1137	0.2057	Note 3
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								Note 3
Anthracene	120-12-7								
Benzene	71-43-2	0.0728			1.8415	3.3331	1.8415	3.3331	Note 3
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.0050			0.1261	0.2282	0.1261	0.2282	Note 3
Formaldehyde	50-00-0								Note 3
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								Note 3
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.0411			1.0396	1.8816	1.0396	1.8816	Note 3
Xylenes	1330-20-7	0.0303			0.7668	1.3879	0.7668	1.3879	Note 3,4
	Total HAPs	0.1537			3.8876	7.0365	3.8876	7.0365	

Note 3: CERP/Technikon Report 1256-1311DQ for organic HAPs associated with green sand mold, Table 3-1
6 mold average adjusted for LOI (4.06 FWNA; 4.97 DQ Test)
Note 4: Xylene CAS number is used for mixture of isomers

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
108 Tons/Year

Flow Diagram Designation
Pouring Cooling Shakeout HAPs (Core)
HAPs

Maximum Hourly Capacity
0.03 Tons/Hour

Process Description:
Fritz Winter North America, LP
Pouring Cooling Shakeout HAPs (Core)
Control Device: CU06 and CU08
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Pouring Cooling Shakeout HAPs (Core)										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/lb									
(source)			Note 1,2								
		Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: See below for organic HAP emissions from pouring, cooling and shakeout attributed to core
Note 2: Inorganic HAPs are quantified on the air pollution control device worksheet for CU06 and CU08

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring Cooling Shakeout HAPs (Core)

HAPs	CAS No.	Emission Factor ton/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2	0.0084			0.5049	0.9129	0.5049	0.9129	Note 3
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.0001			0.0036	0.0065	0.0036	0.0065	
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0022			0.1340	0.2423	0.1340	0.2423	Note 3
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0189			1.1294	2.0421	1.1294	2.0421	Note 3
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.0012			0.0706	0.1276	0.0706	0.1276	Note 3
Xylenes	1330-20-7	0.0003			0.0203	0.0368	0.0203	0.0368	Note 3
	Total HAPs	0.0311			1.8628	3.3681	1.8628	3.3681	

Note 3: Supplier emissions incormation for PUCB ASK Focus I/II

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Sand Plant Waste Sand Silo
EU57

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Sand Plant Waste Sand Silo
Control Device: Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Sand Plant Waste Sand Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Sand Plant Waste Sand Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Casting Cooling
EU59

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Casting Cooling
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Casting Cooling										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.03	0.02	0.01						
(source)			Note 1	Note 1	Note 1						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: 1.0% of emission factor from FIRE 6.25 SCC 3-04-003-31

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Casting Cooling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Sorting Conveyor
EU60

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Sorting Conveyor

Control Device: Fettling Baghouse (CU11)
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Sorting Conveyor										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.02	0.01	0.01						
(source)			Note 1	Note 1	Note 1						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: 0.5% of emission factor from FIRE 6.25 SCC 3-04-003-31

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Sorting Conveyor

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Steel Shot Blasting #1
EU61

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Steel Shot Blasting #1
Control Device: Fettling Baghouse (CU11)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Steel Shot Blasting #1										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	15.50	1.70	1.70						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-40
Note 3: Assumes $PM^{2.5}$ is equal to PM_{10}

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Steel Shot Blasting #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Steel Shot Blasting #2
EU62

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Steel Shot Blasting #2
Control Device: Fettling Baghouse (CU11)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Steel Shot Blasting #2										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	1.60	0.00	0.00						
(source)			Note 1	Note 2	Note 3						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-40
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Steel Shot Blasting #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Fettling Baghouse Waste Dust Silo
EU63

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Fettling Baghouse Waste Dust Silo
Control Device: Fettling BH Waste Dust Silo Bin Vent Filter (CU12)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Fettling Baghouse Waste Dust Silo										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Fettling Baghouse Waste Dust Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Auto Grinding #1
EU64

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Auto Grinding #1
Control Device: Fettling Baghouse (CU11)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Auto Grinding #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.005	0.005						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Auto Grinding #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Auto Grinding #2
EU65

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Auto Grinding #2
Control Device: Fettling Baghouse (CU11)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Auto Grinding #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.005	0.005						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Auto Grinding #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Machining Lines (9)
EU66

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Machining Lines (9)
Control Device: Machining Cartridge Collectors (CU13a-h)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Machining Lines (9)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.005	0.005						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Machining Lines (9)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Perforation Line (1)
EU67

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Perforation Line (1)
Control Device: Machining Cartridge Collectors (CU13i-j)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Perforation Line (1)										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.005	0.005						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Perforation Line (1)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
25.19 Tons/Year

Flow Diagram Designation
Paint Line #3 (Coating)
EU68

Maximum Hourly Capacity
5.75 Lbs/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #3 (Coating)
Control Device: Paint Line #3 Booth Filter (CU14)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Paint Line #3 (Coating)										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.87	0.87	0.87			0.13			
(source)		Note 1	Note 2	Note 2			Note 1			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency		99.00	99.00	99.00						
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions					0.748			
Annual (TPY)							**3.274**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							0.748			
Annual (TPY)							**3.274**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Zinc Dust Primer EDS (INMOTIQ Primer SB 1K) (density is 25.75 lb/gal)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #3 (Coating)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2	0.01%			5.75E-04	2.52E-03	**5.75E-04**	**2.52E-03**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8	0.06%			3.45E-03	1.51E-02	**3.45E-03**	**1.51E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.95%			5.46E-02	2.39E-01	**5.46E-02**	**2.39E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.02%			1.15E-03	5.04E-03	**1.15E-03**	**5.04E-03**	Note 1
Xylenes	1330-20-7	3.89%			2.24E-01	9.80E-01	**2.24E-01**	**9.80E-01**	Note 1
	Total HAPs				2.83E-01	1.24E+00	2.83E-01	1.24E+00	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #3 (Coating)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene	95-63-6	1.81%							Note 1
Zinc	7440-66-6	77.60%							Note 1
Zinc Oxide	1314-13-2	2.40%							Note 1

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
6.44 Tons/Year

Flow Diagram Designation
Paint Line #3 (Thinner)
EU68

Maximum Hourly Capacity
1.47 Lbs/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #3 (Thinner)
Control Device: Paint Line #3 Booth Filter (CU14)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #3 (Thinner)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb						1.00			
(source)							Note 1			
Capture Efficiency							100.00			
Control Efficiency										
Transfer Efficiency										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							1.470			
Annual (TPY)							**6.439**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							1.470			
Annual (TPY)							**6.439**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Reducing Solvent Blend for WG102992 TDS (Thinner Density is 7.26 lb/gal)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #3 (Thinner)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8	0.54%			7.89E-03	3.45E-02	**7.89E-03**	**3.45E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	3.30%			4.85E-02	2.13E-01	**4.85E-02**	**2.13E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7	6.19%			9.10E-02	3.99E-01	**9.10E-02**	**3.99E-01**	Note 1
	Total HAPs	10.03%			**1.47E-01**	**6.46E-01**	**1.47E-01**	**6.46E-01**	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #3 (Thinner)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
n-Butyl Acetate	123-86-4	51.59%			7.58E-01	3.32E+00	**7.58E-01**	**3.32E+00**	Note 1
solvent naphtha	64742-95-6	14.44%			2.12E-01	9.30E-01	**2.12E-01**	**9.30E-01**	Note 1
1,2,4-Trimethylbenzene	95-63-6	14.44%			2.12E-01	9.30E-01	**2.12E-01**	**9.30E-01**	Note 1
Butan-1-ol	71-36-3	6.19%			9.10E-02	3.99E-01	**9.10E-02**	**3.99E-01**	Note 1
Mesitylene	108-67-8	3.30%			4.85E-02	2.13E-01	**4.85E-02**	**2.13E-01**	Note 1

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
25.19 Tons/Year

Flow Diagram Designation
Paint Line #2(Coating)
EU69

Maximum Hourly Capacity
5.75 Lbs/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #2(Coating)
Control Device: Paint Line #2 Booth Filter (CU15)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Paint Line #2(Coating)										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.87	0.87	0.87			0.13			
(source)		Note 1	Note 2	Note 2			Note 1			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency		99.50	99.50	99.50						
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions					0.748			
Annual (TPY)							**3.274**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							0.748			
Annual (TPY)							**3.274**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Zinc Dust Primer EDS (INMOTIQ Primer SB 1K) (density is 25.75 lb/gal)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #2(Coating)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2	0.01%			5.75E-04	2.52E-03	**5.75E-04**	**2.52E-03**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8	0.06%			3.45E-03	1.51E-02	**3.45E-03**	**1.51E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.95%			5.46E-02	2.39E-01	**5.46E-02**	**2.39E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.02%			1.15E-03	5.04E-03	**1.15E-03**	**5.04E-03**	Note 1
Xylenes	1330-20-7	3.89%			2.24E-01	9.80E-01	**2.24E-01**	**9.80E-01**	Note 1
	Total HAPs				2.83E-01	1.24E+00	2.83E-01	1.24E+00	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #2(Coating)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene	95-63-6	1.81%							Note 1
Zinc	7440-66-6	77.60%							Note 1
Zinc Oxide	1314-13-2	2.40%							Note 1

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
6.44 Tons/Year

Flow Diagram Designation
Paint Line #2(Thinner)
EU69

Maximum Hourly Capacity
1.47 Lbs/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #2(Thinner)
Control Device: Paint Line #2 Booth Filter (CU15)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #2(Thinner)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb						1.00			
(source)							Note 1			
Capture Efficiency							100.00			
Control Efficiency										
Transfer Efficiency										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							1.470			
Annual (TPY)							**6.439**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							1.470			
Annual (TPY)							**6.439**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Reducing Solvent Blend for WG102992 TDS (Thinner Density is 7.26 lb/gal)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #2(Thinner)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8	0.54%			7.89E-03	3.45E-02	**7.89E-03**	**3.45E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	3.30%			4.85E-02	2.13E-01	**4.85E-02**	**2.13E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7	6.19%			9.10E-02	3.99E-01	**9.10E-02**	**3.99E-01**	Note 1
	Total HAPs	10.03%			**1.47E-01**	**6.46E-01**	**1.47E-01**	**6.46E-01**	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #2(Thinner)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
n-Butyl Acetate	123-86-4	51.59%			7.58E-01	3.32E+00	**7.58E-01**	**3.32E+00**	Note 1
solvent naphtha	64742-95-6	14.44%			2.12E-01	9.30E-01	**2.12E-01**	**9.30E-01**	Note 1
1,2,4-Trimethylbenzene	95-63-6	14.44%			2.12E-01	9.30E-01	**2.12E-01**	**9.30E-01**	Note 1
Butan-1-ol	71-36-3	6.19%			9.10E-02	3.99E-01	**9.10E-02**	**3.99E-01**	Note 1
Mesitylene	108-67-8	3.30%			4.85E-02	2.13E-01	**4.85E-02**	**2.13E-01**	Note 1

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
15.50 Tons/Year

Flow Diagram Designation
Paint Line #1
EU71

Maximum Hourly Capacity
3.54 Lbs/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #1
Control Device: Paint Line #1 Booth Filter (CU17)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Paint Line #1										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.34	0.34	0.34			0.14			
(source)		Note 1	Note 2	Note 2			Note 3			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency		99.50	99.50	99.50						
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions					0.513			
Annual (TPY)							**2.244**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							0.513			
Annual (TPY)							**2.244**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Geomet 360 SDS (midpoint of % solids range)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM
Note 3: Geomet 360 Air Quality Data Sheet (1.6 lb/gal VOC at coating density of 11.05 lbs/gal
Note 4: Above quantities and emission factors disregard DI water that is used as a thinner

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1	3.40%			1.20E-01	5.27E-01	**1.20E-01**	**5.27E-01**	Note 3
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
	Total HAPs	**3.40%**			1.20E-01	5.27E-01	1.20E-01	5.27E-01	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #1

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Aluminum Powder	7429-90-5	8.50%							Note 1
Distillates (petroleum), hydrotreated light	64742-47-8	1.00%							Note 1
Naphtha, hdrotreated heavy	64742-48-9	1.00%							Note 1
Zinc Powder	7440-66-6	25.00%							Note 1

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Emergency Generator #1
EU72
Process Description:
Emergency Generator #1
Control Device:

Inputs

1050.0	= Max. Hourly Power Output (HP)
7,000	= Btu/hp-hr (AP-42 Table 3.3-1, footnote e)
150000.0	= Maximum Hourly Heat Input (Btu)
100	= Maximum Operation (hours/year)
15	= Maximum Hourly Annual Input (MMBtu)

POLLUTANT	CAS #	Note 1 Emission Factor (lb/MMBtu)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	6.97E-02	1.05E-02	5.23E-04	
NOx	n/a	3.20E+00	4.80E-01	2.40E-02	
CO	n/a	8.50E-01	1.28E-01	6.38E-03	
Lead	n/a				
SO2	n/a	1.52E+00	2.27E-01	1.14E-02	
VOC	n/a	9.00E-02	1.35E-02	6.75E-04	
CO_2e	n/a	1.65E+02	2.48E+01	1.24E+00	
Arsenic (As)	7440-38-2				
Beryllium (Be)	7440-41-7				
Cadmium (Cd)	7440-43-9				
Chromium (Cr)	7440-47-3				
Cobalt (Co)	7440-48-4				
Lead (Pb)	7439-92-1				
Manganese (Mn)	7439-96-5				
Mercury (Hg)	7439-97-6				
Nickel (Ni)	7440-02-0				
Selenium (Se)	7782-49-2				
1,3-Butadiene	106-99-0				
2-Methylnaphthalene (POM)	91-57-6				
3-Methylchloranthrene (POM)	56-49-5				
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6				
Acenaphthene	83-32-9	4.68E-06	7.02E-07	3.51E-08	Note 3
Acenaphthylene	208-96-8	9.23E-06	1.38E-06	6.92E-08	Note 3
Acetaldehyde	75-07-0	2.52E-05	3.78E-06	1.89E-07	
Acrolein	107-02-8	7.88E-06	1.18E-06	5.91E-08	Note 2
Anthracene	120-12-7	1.23E-06	1.85E-07	9.23E-09	Note 3
Benz(a)anthracene (POM)	56-55-3	6.22E-07	9.33E-08	4.67E-09	Note 3
Benzene	71-43-2	7.76E-04	1.16E-04	5.82E-06	
Benzo(a)pyrene (POM)	50-32-8	2.57E-07	3.86E-08	1.93E-09	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.11E-06	1.67E-07	8.33E-09	Note 3
Benzo(g,h,i)perylene (POM)	191-24-2	5.56E-07	8.34E-08	4.17E-09	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	2.18E-07	3.27E-08	1.64E-09	Note 2,3
Chrysene (POM)	218-01-9	1.53E-06	2.30E-07	1.15E-08	Note 3
Dibenzo(a,h)anthracene (POM)	53-70-3	3.46E-07	5.19E-08	2.60E-09	Note 2,3
Dichlorobenzene	25321-22-6				
Fluoranthene (POM)	206-44-0	4.03E-06	6.05E-07	3.02E-08	Note 3
Fluorene (POM)	86-73-7	1.28E-05	1.92E-06	9.60E-08	Note 3
Formaldehyde	50-00-0	7.89E-05	1.18E-05	5.92E-07	
Hexane	110-54-3				
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	4.14E-07	6.21E-08	3.11E-09	Note 2,3
Naphthalene	91-20-3	1.30E-04	1.95E-05	9.75E-07	
Phenanathrene (POM)	85-01-8	4.08E-05	6.12E-06	3.06E-07	Note 3
Pyrene (POM)	129-00-0	3.71E-06	5.57E-07	2.78E-08	Note 3
Toluene	108-88-3	2.81E-04	4.22E-05	2.11E-06	
Xylenes	1330-20-7	1.93E-04	2.90E-05	1.45E-06	
Total POM			1.22E-05	6.11E-07	
Total HAPs			2.36E-04	1.18E-05	

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Emergency Generator #2
EU73
Process Description:
Emergency Generator #2
Control Device:

Inputs

1050.0	= Max. Hourly Power Output (HP)
7,000	= Btu/hp-hr (AP-42 Table 3.4-1, footnote e)
150000.0	= Maximum Hourly Heat Input (Btu)
100	= Maximum Operation (hours/year)
15	= Maximum Hourly Annual Input (MMBtu)

POLLUTANT	CAS #	Note 1 Emission Factor (lb/MMBtu)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	6.97E-02	1.05E-02	5.23E-04	
NOx	n/a	3.20E+00	4.80E-01	2.40E-02	
CO	n/a	8.50E-01	1.28E-01	6.38E-03	
Lead	n/a				
SO2	n/a	1.52E+00	2.28E-01	1.14E-02	
VOC	n/a	9.00E-02	1.35E-02	6.75E-04	
CO_2e	n/a	1.65E+02	2.48E+01	1.24E+00	
Arsenic (As)	7440-38-2				
Beryllium (Be)	7440-41-7				
Cadmium (Cd)	7440-43-9				
Chromium (Cr)	7440-47-3				
Cobalt (Co)	7440-48-4				
Lead (Pb)	7439-92-1				
Manganese (Mn)	7439-96-5				
Mercury (Hg)	7439-97-6				
Nickel (Ni)	7440-02-0				
Selenium (Se)	7782-49-2				
1,3-Butadiene	106-99-0				
2-Methylnaphthalene (POM)	91-57-6				
3-Methylchloranthrene (POM)	56-49-5				
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6				
Acenaphthene	83-32-9	4.68E-06	7.02E-07	3.51E-08	Note 3
Acenaphthylene	208-96-8	9.23E-06	1.38E-06	6.92E-08	Note 3
Acetaldehyde	75-07-0	2.52E-05	3.78E-06	1.89E-07	
Acrolein	107-02-8	7.88E-06	1.18E-06	5.91E-08	Note 2
Anthracene	120-12-7	1.23E-06	1.85E-07	9.23E-09	Note 3
Benz(a)anthracene (POM)	56-55-3	6.22E-07	9.33E-08	4.67E-09	Note 3
Benzene	71-43-2	7.76E-04	1.16E-04	5.82E-06	
Benzo(a)pyrene (POM)	50-32-8	2.57E-07	3.86E-08	1.93E-09	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.11E-06	1.67E-07	8.33E-09	Note 3
Benzo(g,h,i)perylene (POM)	191-24-2	5.56E-07	8.34E-08	4.17E-09	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	2.18E-07	3.27E-08	1.64E-09	Note 2,3
Chrysene (POM)	218-01-9	1.53E-06	2.30E-07	1.15E-08	Note 3
Dibenzo(a,h)anthracene (POM)	53-70-3	3.46E-07	5.19E-08	2.60E-09	Note 2,3
Dichlorobenzene	25321-22-6				
Fluoranthene (POM)	206-44-0	4.03E-06	6.05E-07	3.02E-08	Note 3
Fluorene (POM)	86-73-7	1.28E-05	1.92E-06	9.60E-08	Note 3
Formaldehyde	50-00-0	7.89E-05	1.18E-05	5.92E-07	
Hexane	110-54-3				
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	4.14E-07	6.21E-08	3.11E-09	Note 2,3
Naphthalene	91-20-3	1.30E-04	1.95E-05	9.75E-07	
Phenanathrene (POM)	85-01-8	4.08E-05	6.12E-06	3.06E-07	Note 3
Pyrene (POM)	129-00-0	3.71E-06	5.57E-07	2.78E-08	Note 3
Toluene	108-88-3	2.81E-04	4.22E-05	2.11E-06	
Xylenes	1330-20-7	1.93E-04	2.90E-05	1.45E-06	
Total POM			1.22E-05	6.11E-07	
Total HAPs			2.36E-04	1.18E-05	

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Emergency Generator #3
EU74
Process Description:
Emergency Generator #3
Control Device:

Inputs

56.0	= Max. Hourly Power Output (HP)
7,000	= Btu/hp-hr (AP-42 Table 3.3-1, footnote a)
8000.0	= Maximum Hourly Heat Input (Btu)
100	= Maximum Operation (hours/year)
0.8	= Maximum Hourly Annual Input (MMBtu)

POLLUTANT	CAS #	Note 1 Emission Factor (lb/MMBtu)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a				
NOx	n/a	4.41E+00	3.53E-02	1.76E-03	
CO	n/a	9.50E-01	7.60E-03	3.80E-04	
Lead	n/a				
SO2	n/a	2.90E-01	2.32E-03	1.16E-04	
VOC	n/a	3.50E-01	2.80E-03	1.40E-04	
CO_2e	n/a	1.64E+02	1.31E+00	6.56E-02	
Arsenic (As)	7440-38-2				
Beryllium (Be)	7440-41-7				
Cadmium (Cd)	7440-43-9				
Chromium (Cr)	7440-47-3				
Cobalt (Co)	7440-48-4				
Lead (Pb)	7439-92-1				
Manganese (Mn)	7439-96-5				
Mercury (Hg)	7439-97-6				
Nickel (Ni)	7440-02-0				
Selenium (Se)	7782-49-2				
1,3-Butadiene	106-99-0	3.91E-05	3.13E-07	1.56E-08	Note 2
2-Methylnaphthalene (POM)	91-57-6				
3-Methylchloranthrene (POM)	56-49-5				
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6				
Acenaphthene	83-32-9	1.42E-06	1.14E-08	5.68E-10	Note 2,3
Acenaphthylene	208-96-8	5.06E-06	4.05E-08	2.02E-09	Note 2,3
Acetaldehyde	75-07-0	7.67E-04	6.14E-06	3.07E-07	
Acrolein	107-02-8	9.25E-05	7.40E-07	3.70E-08	Note 2
Anthracene	120-12-7	1.87E-06	1.50E-08	7.48E-10	Note 3
Benz(a)anthracene (POM)	56-55-3	1.68E-06	1.34E-08	6.72E-10	Note 3
Benzene	71-43-2	9.33E-04	7.46E-06	3.73E-07	
Benzo(a)pyrene (POM)	50-32-8	1.88E-07	1.50E-09	7.52E-11	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	9.91E-08	7.93E-10	3.96E-11	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	4.89E-07	3.91E-09	1.96E-10	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.55E-07	1.24E-09	6.20E-11	Note 2,3
Chrysene (POM)	218-01-9	3.53E-07	2.82E-09	1.41E-10	Note 3
Dibenzo(a,h)anthracene (POM)	53-70-3	5.83E-07	4.66E-09	2.33E-10	Note 2,3
Dichlorobenzene	25321-22-6				
Fluoranthene (POM)	206-44-0	7.61E-06	6.09E-08	3.04E-09	Note 3
Fluorene (POM)	86-73-7	2.92E-05	2.34E-07	1.17E-08	Note 3
Formaldehyde	50-00-0	1.18E-03	9.44E-06	4.72E-07	
Hexane	110-54-3				
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	3.75E-07	3.00E-09	1.50E-10	Note 2,3
Naphthalene	91-20-3	8.48E-05	6.78E-07	3.39E-08	
Phenanathrene (POM)	85-01-8	2.94E-05	2.35E-07	1.18E-08	Note 3
Pyrene (POM)	129-00-0	4.78E-06	3.82E-08	1.91E-09	Note 3
Toluene	108-88-3	4.09E-04	3.27E-06	1.64E-07	
Xylenes	1330-20-7	2.85E-04	2.28E-06	1.14E-07	
Total POM			6.66E-07	3.33E-08	
Total HAPs			3.10E-05	1.55E-06	

Note 1: AP-42, 10/1996, Section 3.3, Tables 3.3-1 and 3.3-2 [Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Tank No.	Diesel Storage Tank (1000 gallon)	**Tank type**	Horizontal	**Date**		02/10/22	
Material stored	Fuel Oil No. 2 (Diesel)	**Company**	Fritz Winter North America	**Performed by**		Craig Schmeisser	
City	Franklin	**State**	KY			Mad River Strategies, LLC	
Description	Diesel Storage Tank (1000 gallon)						

INPUT DATA					CALCULATIONS				
	Reference	**Symbol**	**Values**	**Units**		**Reference**	**Symbol**		**Units**
					Breathing losses				
Molecular Weight					Tank vapor space volume	AP-42, Section 7.1, pg 7.1-16, Eq. 1-3	V_V	136.92	ft^3
Molecular weight	AP-42, Section 7.1, Table 7.1-2, pg 7.1-92	M_V	130	Lb/lb-mole	Vapor density	AP-42, Section 7.1, pg 7.1-23, Eq. 1-22	W_V	1.591E-04	lb/ft^3
Tank design data					Vapor space expansion factor	AP-42, Section 7.1, pg 7.1-20, Eq. 1-12	K_E	0.03212	Dimensionless
Shell height	See Horizontal Tank Calcs Below - Calculated	H or H_E	4.42	ft	Vented vapor saturation factor	AP-42, Section 7.1, pg 7.1-22, Eq. 1-21	K_S	0.9992	Dimensionless
Diameter	See Horizontal Tank Calcs Below - Calculated	D or D_E	8.88	ft					
Maximum liquid height	AP-42, Section 7.1, pg 7.1-28	H_{LX}	4.42	ft	**Standing Storage Loss (Breathing Loss)**	AP-42, Section 7.1, pg 7.1-16, Eq. 1-2	L_S	0.2551	lb/yr
Minimum liquid height	AP-42, Section 7.1, pg 7.1-28	H_{LN}	0.00	ft					
Vapor Space Outage	AP-42, Section 7.1, pg 7.1-21	H_{VO}	2.21	ft	**Working losses**	AP-42, Section 7.1, pg 7.1-28, Eq. 1-35	L_W	137.3876	lb/yr
Annual Sum of the increases in liquid level	AP-42, Section 7.1, pg 7.1-28, Eq. 1-37	$\sum H_{OI}$	69.07	ft/yr					
Tank Maximum Liquid Volume	AP-42, Section 7.1, pg 7.1-201, Eq. 60-4	V_{LX}	274	ft^3					
Turnovers	AP-42, Section 7.1, pg 7.1-28	N	16	Dimensionless	**TOTAL LOSSES**	Calculated	L_T	**137.6427**	lb/yr
Net throughput	Calculated @ 31.5 gals/bbl	Q	762	bbl/yr					
Turnover factor	AP-42, Section 7.1, pg 7.1-28	K_N	1.00	Dimensionless					
Working loss product factor	AP-42, Section 7.1, pg 7.1-28	K_P	1.00	Dimensionless					
Net working loss throughput	AP-42, Section 7.1, pg 7.1-29, Eq. 1-38	V_Q	4277.33	bb/yr					
Meteorological data									
Daily ave. ambient temp.	AP-42, Section 7.1, pg 7.1-26, Eq. 1-30	T_{AA}	519.85	°R					
Daily max. ambient temp.	AP-42, Section 7.1, Table 7.1-7, pg 7.1-132 Nashville, TN as location	T_{AX}	529.40	°R					
Daily min. ambient temp.	AP-42, Section 7.1, Table 7.1-7, pg 7.1-63 Nashville, TN as location	T_{AN}	510.30	°R					
Daily ambient temp. range	AP-42, Section 7.1, pg 7.1-19, Eq. 1-11	ΔT_A	19.10	°R					
Tank paint solar absorptance	AP-42, Section 7.1, Table 7.1-6, pg 7.1-102 White Tank	a	0.17	Dimensionless					
Daily total insolation factor	AP-42, Section 7.1, Table 7.1-7, pg 7.1-63 Nashville, TN as location	I	1,316	Btu/ft^2-day					
Liquid bulk temperature	AP-42, Section 7.1, pg 7.1-27, Eq. 1-31	T_B	520.52	°R					
Daily vapor temp. range	AP-42, Section 7.1, pg 7.1-18, Eq. 1-7	ΔT_V	17.84	°R					
Daily ave. liquid surface temp.	AP-42, Section 7.1, pg 7.1-26, Eq. 1-28	T_{LA}	521.37	°R					
Daily max. liquid surface temp.	AP-42, Section 7.1, pg 7.1-83, Fig. 7.1-17	T_{LX}	525.83	°R					
Daily min. liquid surface temp.	AP-42, Section 7.1, pg 7.1-83, Fig. 7.1-17	T_{LN}	516.91	°R					
Average vapor temperature	AP-42, Section 7.1, pg 7.1-27, Eq. 1-33	T_v	522.06	°R					
VP @ daily ave. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VA}	0.0069	psi					
VP @ daily max. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VX}	0.0079	psi					
VP @ daily min. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VN}	0.0059	psi					
Daily vapor pressure range	AP-42, Section 7.1, pg 7.1-18, Eq. 1-9	ΔP_V	0.0020	psia					
Breather vent pressure setting range	AP-42, Section 7.1, pg 7.1-19, Eq. 1-10	ΔP_B	0.06	psig					
Breather vent pressure setting	AP-42, Section 7.1, pg 7.1-19	P_{BP}	0.03	psig					
Breather vent vacuum setting	AP-42, Section 7.1, pg 7.1-19	P_{BV}	(0.03)	psig					
Vent setting correction factor	AP-42, Section 7.1, pg 7.1-28, Eq. 1-37 notes	Kb	1.00	Dimensionless					

INPUT DATA					CALCULATIONS				
	Reference	**Symbol**		**Units**			**Symbol**		**Units**
Calculations for Horizontal Tanks					**Constants**				
Effective Diameter Calculation					Ideal Gas Constant	Input	R	10.731	psia*ft^3/lb-mole**R
Length	Input	L	11.00	ft	ASTM-D86 distillation slope				
Diameter	Input	D	5.63	ft		AP-42, Section 7.1, Table 7.1-2, pg 7.1-92	S		°F/vol %
Effective Diameter	AP-42, Section 7.1, pg 7.1-21, Eq. 1-14	D_e	8.88	ft	Constant in VP Equation	AP-42, Section 7.1, pg 7.1-82, Fig. 7.1-15	A	12.101	Dimensionless
					Constant in VP Equation	AP-42, Section 7.1, pg 7.1-82, Fig. 7.1-15	B	8907	°R
Effective Height Calculation									
Effective Height	AP-42, Section 7.1, pg 7.1-21, Eq. 1-15	H_e	4.422	ft					
Annual Throughput Rate									
Diesel	Air Permit Application	None	24000	gal					

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Snag Grinder #1
EU77

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Snag Grinder #1
Control Device: Snag Grinder #1 Fabric Filter
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 68 °F

Facility Process Name:		**Criteria Pollutants**								
Snag Grinder #1										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.005	0.005						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Snag Grinder #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Snag Grinder #2
EU78

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Snag Grinder #2
Control Device: Snag Grinder #2 Fabric Filter
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 68 °F

Facility Process Name:		**Criteria Pollutants**								
Snag Grinder #2										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.005	0.005						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Snag Grinder #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
135.0 Tons/Year Note 1

Flow Diagram Designation
Core Wash Station #2
EU79

Maximum Hourly Capacity
0.338 Tons/Hour Note 1

Process Description:
Fritz Winter North America, LP
Core Wash Station #2
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Core Wash Station #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						0.76%			
(source)							Note 2			
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							5.130			
Annual (TPY)							**1.026**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							5.130			
Annual (TPY)							**1.026**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Usage from original permit application
Note 2: VOC Content from original permit application; ASK rep indicated less than 0.1% VOC

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Wash Station #2

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
135.0 Tons/Year Note 1

Flow Diagram Designation
Core Wash Station #3
EU80

Maximum Hourly Capacity
0.338 Tons/Hour Note 1

Process Description:
Fritz Winter North America, LP
Core Wash Station #3
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Core Wash Station #3									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						0.76%			
(source)							Note 2			
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							5.130			
Annual (TPY)							**1.026**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							5.130			
Annual (TPY)							**1.026**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Usage from original permit application
Note 2: VOC Content from original permit application; ASK rep indicated less than 0.1% VOC

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Wash Station #3

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
135.0 Tons/Year Note 1

Flow Diagram Designation
Core Wash Station #4
EU81

Maximum Hourly Capacity
0.338 Tons/Hour Note 1

Process Description:
Fritz Winter North America, LP
Core Wash Station #4
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Core Wash Station #4									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						0.76%			
(source)							Note 2			
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							5.130			
Annual (TPY)							**1.026**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							5.130			
Annual (TPY)							**1.026**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Usage from original permit application
Note 2: VOC Content from original permit application; ASK rep indicated less than 0.1% VOC

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Wash Station #4

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
10.0 Tons/Year

Flow Diagram Designation
Rust Prohibitive Application
EU82

Maximum Hourly Capacity
0.013 Tons/Hour

Process Description:
Fritz Winter North America, LP
Rust Prohibitive Application
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Rust Prohibitive Application									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						10.00%			
(source)							Note 1,2			
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)							2.500			
Annual (TPY)							**1.000**			
Total Emission Rate:										
Hourly (lb/hr)							2.500			
Annual (TPY)							**1.000**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Weight loss study
Note 2: Usage is for virgin product. Virgin product is thinned with water prior to use.

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Rust Prohibitive Application

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Melt Baghouse (CU01)
CU01

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Melt Baghouse (CU01)

Control Device:	Melt Baghouse (CU01)		
SCC Code:			
Control Device Outlet:	0.002	gr/dscf	Note 1
Airflow:	160,000	acfm	Note 2
Stack Gas Temperature:	90	°F	Note 2

Facility Process Name:	**Criteria Pollutants**								
Melt Baghouse (CU01)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	2.643	2.643	2.643						
Annual (TPY)	**11.577**	**11.577**	**11.577**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	2.643	2.643	2.643						
Annual (TPY)	**11.577**	**11.577**	**11.577**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM10 and PM2.5 emission limit
Note 2: Consideration of conditions observed during 2018 and 2020 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Melt Baghouse (CU01)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 3
Arsenic (As)	7440-38-2	0.0075%			1.98E-04	8.69E-04	**1.98E-04**	**8.69E-04**	Note 3
Beryllium (Be)	7440-41-7								Note 3
Cadmium (Cd)	7440-43-9	0.0051%			1.36E-04	5.94E-04	**1.36E-04**	**5.94E-04**	Note 3
Chromium (Cr)	7440-47-3	0.0491%			1.30E-03	5.68E-03	**1.30E-03**	**5.68E-03**	Note 3
Cobalt (Co)	7440-48-4	0.0036%			9.54E-05	4.18E-04	**9.54E-05**	**4.18E-04**	Note 3
Lead (Pb)	7439-92-1	0.5140%			1.36E-02	5.95E-02	**1.36E-02**	**5.95E-02**	Note 3
Manganese (Mn)	7439-96-5	3.4000%			8.99E-02	3.94E-01	**8.99E-02**	**3.94E-01**	Note 3
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0142%			3.75E-04	1.64E-03	**3.75E-04**	**1.64E-03**	Note 3
Selenium (Se)	7782-49-2	0.0027%			7.06E-05	3.09E-04	**7.06E-05**	**3.09E-04**	Note 3
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
	Total HAPs	**4.00%**			1.06E-01	4.63E-01	1.06E-01	4.63E-01	

Note 3: Pace Analytical Report dated June 10, 2021 (Melt)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)
CU02

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)

Control Device:	Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)		
SCC Code:			
Control Device Outlet:	0.003	gr/dscf	Note 1
Airflow:	600	acfm	Note 2
Stack Gas Temperature:	68	°F	

Facility Process Name:	**Criteria Pollutants**								
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.068**	**0.068**	**0.068**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.068**	**0.068**	**0.068**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
Note 3 8,760 HRS/YEAR

Note 1: Requested BACT PM, PM10 and PM2.5 emission limit
Note 2: Expected air volume when delivering dust to silo.
Note 3: Assumes delivery of sand is occurring continuously

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 4
Arsenic (As)	7440-38-2	0.0075%			1.16E-06	5.09E-06	**1.16E-06**	**5.09E-06**	Note 4
Beryllium (Be)	7440-41-7	0.0001%			8.19E-09	3.59E-08	**8.19E-09**	**3.59E-08**	Note 4
Cadmium (Cd)	7440-43-9	0.0051%			7.94E-07	3.48E-06	**7.94E-07**	**3.48E-06**	Note 4
Chromium (Cr)	7440-47-3	0.0491%			7.60E-06	3.33E-05	**7.60E-06**	**3.33E-05**	Note 4
Cobalt (Co)	7440-48-4	0.0036%			5.59E-07	2.45E-06	**5.59E-07**	**2.45E-06**	Note 4
Lead (Pb)	7439-92-1	0.5140%			7.96E-05	3.49E-04	**7.96E-05**	**3.49E-04**	Note 4
Manganese (Mn)	7439-96-5	3.4000%			5.27E-04	2.31E-03	**5.27E-04**	**2.31E-03**	Note 4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0142%			2.20E-06	9.63E-06	**2.20E-06**	**9.63E-06**	Note 4
Selenium (Se)	7782-49-2	0.0027%			4.14E-07	1.81E-06	**4.14E-07**	**1.81E-06**	Note 4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
Total HAPs		**4.00%**			6.19E-04	2.71E-03	6.19E-04	2.71E-03	

Note 4: Pace Analytical Report dated June 10, 2021 (maximum value of Melt and Core values)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
MMCF/Year

Flow Diagram Designation
Mold Silica Sand Silo Bin Vent Filter (CU03)
CU03

Maximum Hourly Capacity
MMCF/Hour

Process Description:
Fritz Winter North America, LP
Mold Silica Sand Silo Bin Vent Filter (CU03)
Control Device: Mold Silica Sand Silo Bin Vent Filter (CU03)
SCC Code:
Control Device Outlet: 0.003 gr/dscf Note 1
Airflow: 600 acfm Note 2
Stack Gas Temperature: 68 °F

Facility Process Name:	**Criteria Pollutants**								
Mold Silica Sand Silo Bin Vent Filter (CU03)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.0010**	**0.0010**	**0.0010**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.0010**	**0.0010**	**0.0010**						

PROPOSED OPERATING SCHEDULE
1.25 HRS/DAY
Note 3 125 HRS/YEAR

Note 1: Requested BACT PM, PM10 and PM2.5 emission limit
Note 2: Expected air volume when delivering dust pnuematically from truck to silo.
Note 3: Pnuematic conveying of sand from truck to silo is approximately 1.25 hrs/day, 2 days/week, 50 weeks/yr

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Silica Sand Silo Bin Vent Filter (CU03)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
MMCF/Year

Flow Diagram Designation
Blend Silo Bin Vent Filter (CU04)
CU04

Maximum Hourly Capacity
MMCF/Hour

Process Description:
Fritz Winter North America, LP
Blend Silo Bin Vent Filter (CU04)

Control Device:	Blend Silo Bin Vent Filter (CU04)		
SCC Code:			
Control Device Outlet:	0.003	gr/dscf	Note 1
Airflow:	600	acfm	Note 2
Stack Gas Temperature:	68	°F	

Facility Process Name:	**Criteria Pollutants**								
Blend Silo Bin Vent Filter (CU04)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.0010**	**0.0010**	**0.0010**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.0010**	**0.0010**	**0.0010**						

PROPOSED OPERATING SCHEDULE
1.25 HRS/DAY
Note 3 125 HRS/YEAR

Note 1: Requested BACT PM, PM10 and PM2.5 emission limit
Note 2: Expected air volume when delivering dust pnuematically from truck to silo.
Note 3: Pnuematic conveying of sand from truck to silo is approximately 1.25 hrs/day, 2 days/week, 50 weeks/yr

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Blend Silo Bin Vent Filter (CU04)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
MMCF/Year

Flow Diagram Designation
Bentonite Silo Bin Vent Filter (CU05)
CU05

Maximum Hourly Capacity
MMCF/Hour

Process Description:
Fritz Winter North America, LP
Bentonite Silo Bin Vent Filter (CU05)

Control Device:	Bentonite Silo Bin Vent Filter (CU05)		
SCC Code:			
Control Device Outlet:	0.003	gr/dscf	Note 1
Airflow:	600	acfm	Note 2
Stack Gas Temperature:	68	°F	

Facility Process Name:	**Criteria Pollutants**								
Bentonite Silo Bin Vent Filter (CU05)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.0010**	**0.0010**	**0.0010**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.0010**	**0.0010**	**0.0010**						

PROPOSED OPERATING SCHEDULE
1.25 HRS/DAY
Note 3 125 HRS/YEAR

Note 1: Requested BACT PM, PM10 and PM2.5 emission limit
Note 2: Expected air volume when delivering dust pnuematically from truck to silo.
Note 3: Pnuematic conveying of sand from truck to silo is approximately 1.25 hrs/day, 2 days/week, 50 weeks/yr

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Bentonite Silo Bin Vent Filter (CU05)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Sand Plant Baghouse (CU06)
CU06

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Sand Plant Baghouse (CU06)

Control Device:	Sand Plant Baghouse (CU06)		
SCC Code:			
Control Device Outlet:	0.0025	gr/dscf	Note 1
Airflow:	105,000	acfm	Note 2
Stack Gas Temperature:	80	°F	Note 2

Facility Process Name:	**Criteria Pollutants**								
Sand Plant Baghouse (CU06)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	2.208	2.208	2.208						
Annual (TPY)	**9.673**	**9.673**	**9.673**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	2.208	2.208	2.208						
Annual (TPY)	**9.673**	**9.673**	**9.673**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM10 and PM2.5 emission limit
Note 2: Consideration of conditions observed during 2018 and 2020 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Sand Plant Baghouse (CU06)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 3
Arsenic (As)	7440-38-2	0.0003%			7.69E-06	3.37E-05	**7.69E-06**	**3.37E-05**	Note 3
Beryllium (Be)	7440-41-7	0.0001%			2.36E-06	1.03E-05	**2.36E-06**	**1.03E-05**	Note 3
Cadmium (Cd)	7440-43-9	0.0000%			2.47E-07	1.08E-06	**2.47E-07**	**1.08E-06**	Note 3
Chromium (Cr)	7440-47-3	0.0010%			2.13E-05	9.33E-05	**2.13E-05**	**9.33E-05**	Note 3
Cobalt (Co)	7440-48-4	0.0003%			6.56E-06	2.87E-05	**6.56E-06**	**2.87E-05**	Note 3
Lead (Pb)	7439-92-1	0.0019%			4.09E-05	1.79E-04	**4.09E-05**	**1.79E-04**	Note 3
Manganese (Mn)	7439-96-5	0.0152%			3.36E-04	1.47E-03	**3.36E-04**	**1.47E-03**	Note 3
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0006%			1.43E-05	6.25E-05	**1.43E-05**	**6.25E-05**	Note 3
Selenium (Se)	7782-49-2	0.0002%			3.62E-06	1.59E-05	**3.62E-06**	**1.59E-05**	Note 3
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
	Total HAPs	**0.02%**			4.33E-04	1.89E-03	4.33E-04	1.89E-03	

Note 3: Pace Analytical Report dated June 10, 2021 (Sand)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
1 Tons/Year

Flow Diagram Designation
Acid Scrubber (CU07)
CU07

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Acid Scrubber (CU07)

Control Device:	Acid Scrubber (CU07)		
SCC Code:			
Control Device Outlet:	0.0005	gr/dscf	Note 1
Airflow:	15,000	acfm	Note 2
Stack Gas Temperature:	68	°F	Note 2

Facility Process Name:	**Criteria Pollutants**								
Acid Scrubber (CU07)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.065	0.065	0.065						
Annual (TPY)	**0.283**	**0.283**	**0.283**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.065	0.065	0.065						
Annual (TPY)	**0.283**	**0.283**	**0.283**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM10 and PM2.5 emission limit
Note 2: Consideration of conditions observed during 2018 and 2020 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Acid Scrubber (CU07)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Core/Mold Baghouse (CU08)
CU08

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Core/Mold Baghouse (CU08)

Control Device:	Core/Mold Baghouse (CU08)		
SCC Code:			
Control Device Outlet:	0.002	gr/dscf	Note 1
Airflow:	115,000	acfm	Note 2
Stack Gas Temperature:	90	°F	Note 2

Facility Process Name:	**Criteria Pollutants**								
Core/Mold Baghouse (CU08)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	1.900	1.900	1.900						
Annual (TPY)	**8.321**	**8.321**	**8.321**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	1.900	1.900	1.900						
Annual (TPY)	**8.321**	**8.321**	**8.321**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM10 and PM2.5 emission limit
Note 2: Consideration of conditions observed during 2018 and 2020 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core/Mold Baghouse (CU08)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 3
Arsenic (As)	7440-38-2	0.0002%			3.08E-06	1.35E-05	**3.08E-06**	**1.35E-05**	Note 3
Beryllium (Be)	7440-41-7	0.0001%			1.00E-06	4.40E-06	**1.00E-06**	**4.40E-06**	Note 3
Cadmium (Cd)	7440-43-9	0.0000%			2.11E-07	9.24E-07	**2.11E-07**	**9.24E-07**	Note 3
Chromium (Cr)	7440-47-3	0.0012%			2.20E-05	9.65E-05	**2.20E-05**	**9.65E-05**	Note 3
Cobalt (Co)	7440-48-4	0.0002%			3.21E-06	1.41E-05	**3.21E-06**	**1.41E-05**	Note 3
Lead (Pb)	7439-92-1	0.0009%			1.74E-05	7.61E-05	**1.74E-05**	**7.61E-05**	Note 3
Manganese (Mn)	7439-96-5	0.0248%			4.71E-04	2.06E-03	**4.71E-04**	**2.06E-03**	Note 3
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0005%			9.57E-06	4.19E-05	**9.57E-06**	**4.19E-05**	Note 3
Selenium (Se)	7782-49-2								Note 3
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
	Total HAPs	**0.03%**			5.28E-04	2.31E-03	5.28E-04	2.31E-03	

Note 3: Pace Analytical Report dated June 10, 2021 (Core)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
1 Tons/Year

Flow Diagram Designation
Sand Plant Baghouse Waste Sand Silo Bin Vent Fil
CU10

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)
Control Device: Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)
SCC Code:
Control Device Outlet: 0.003 gr/dscf Note 1
Airflow: 600 acfm Note 2
Stack Gas Temperature: 68 °F

Facility Process Name:	**Criteria Pollutants**								
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.068**	**0.068**	**0.068**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.068**	**0.068**	**0.068**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
Note 3 8,760 HRS/YEAR

Note 1: Requested BACT PM, PM10 and PM2.5 emission limit
Note 2: Expected air volume when delivering dust to silo.
Note 3: Assumes delivery of sand is occurring continuously

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 4
Arsenic (As)	7440-38-2	0.0003%			5.39E-08	2.36E-07	**5.39E-08**	**2.36E-07**	Note 4
Beryllium (Be)	7440-41-7	0.0001%			1.66E-08	7.26E-08	**1.66E-08**	**7.26E-08**	Note 4
Cadmium (Cd)	7440-43-9	0.0000%			1.73E-09	7.60E-09	**1.73E-09**	**7.60E-09**	Note 4
Chromium (Cr)	7440-47-3	0.0010%			1.49E-07	6.55E-07	**1.49E-07**	**6.55E-07**	Note 4
Cobalt (Co)	7440-48-4	0.0003%			4.60E-08	2.01E-07	**4.60E-08**	**2.01E-07**	Note 4
Lead (Pb)	7439-92-1	0.0019%			2.87E-07	1.25E-06	**2.87E-07**	**1.25E-06**	Note 4
Manganese (Mn)	7439-96-5	0.0152%			2.35E-06	1.03E-05	**2.35E-06**	**1.03E-05**	Note 4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0006%			1.00E-07	4.38E-07	**1.00E-07**	**4.38E-07**	Note 4
Selenium (Se)	7782-49-2	0.0002%			2.54E-08	1.11E-07	**2.54E-08**	**1.11E-07**	Note 4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
	Total HAPs	**0.02%**			3.03E-06	1.33E-05	3.03E-06	1.33E-05	

Note 4: Pace Analytical Report dated June 10, 2021 (Sand)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Fettling Baghouse (CU11)
CU11

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Fettling Baghouse (CU11)

Control Device:	Fettling Baghouse (CU11)		
SCC Code:			
Control Device Outlet:	0.001	gr/dscf	Note 1
Airflow:	65,000	acfm	Note 2
Stack Gas Temperature:	55	°F	Note 2

Facility Process Name:	**Criteria Pollutants**								
Fettling Baghouse (CU11)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.573	0.573	0.573						
Annual (TPY)	**2.511**	**2.511**	**2.511**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.573	0.573	0.573						
Annual (TPY)	**2.511**	**2.511**	**2.511**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM10 and PM2.5 emission limit
Note 2: Consideration of conditions observed during 2018 and 2020 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Fettling Baghouse (CU11)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 3
Arsenic (As)	7440-38-2	0.0019%			1.11E-05	4.87E-05	**1.11E-05**	**4.87E-05**	Note 3
Beryllium (Be)	7440-41-7								Note 3
Cadmium (Cd)	7440-43-9	0.0001%			4.95E-07	2.17E-06	**4.95E-07**	**2.17E-06**	Note 3
Chromium (Cr)	7440-47-3	0.1360%			7.80E-04	3.42E-03	**7.80E-04**	**3.42E-03**	Note 3
Cobalt (Co)	7440-48-4	0.0026%			1.49E-05	6.53E-05	**1.49E-05**	**6.53E-05**	Note 3
Lead (Pb)	7439-92-1	0.0018%			1.04E-05	4.57E-05	**1.04E-05**	**4.57E-05**	Note 3
Manganese (Mn)	7439-96-5	0.8650%			4.96E-03	2.17E-02	**4.96E-03**	**2.17E-02**	Note 3
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0375%			2.15E-04	9.42E-04	**2.15E-04**	**9.42E-04**	Note 3
Selenium (Se)	7782-49-2	0.0019%			1.07E-05	4.67E-05	**1.07E-05**	**4.67E-05**	Note 3
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
	Total HAPs	**1.05%**			6.00E-03	2.63E-02	6.00E-03	2.63E-02	

Note 3: Pace Analytical Report dated June 10, 2021 (Fettling)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)
CU12

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)

Control Device:	Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)		
SCC Code:			
Control Device Outlet:	0.003	gr/dscf	Note 1
Airflow:	600	acfm	Note 2
Stack Gas Temperature:	68	°F	

Facility Process Name:	**Criteria Pollutants**								
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.068**	**0.068**	**0.068**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.068**	**0.068**	**0.068**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
Note 3 8,760 HRS/YEAR

Note 1: Requested BACT PM, PM10 and PM2.5 emission limit
Note 2: Expected air volume when delivering dust to silo.
Note 3: Assumes delivery of sand is occurring continuously

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 4
Arsenic (As)	7440-38-2	0.0019%			3.00E-07	1.32E-06	**3.00E-07**	**1.32E-06**	Note 4
Beryllium (Be)	7440-41-7								Note 4
Cadmium (Cd)	7440-43-9	0.0001%			1.34E-08	5.85E-08	**1.34E-08**	**5.85E-08**	Note 4
Chromium (Cr)	7440-47-3	0.1360%			2.11E-05	9.23E-05	**2.11E-05**	**9.23E-05**	Note 4
Cobalt (Co)	7440-48-4	0.0026%			4.03E-07	1.76E-06	**4.03E-07**	**1.76E-06**	Note 4
Lead (Pb)	7439-92-1	0.0018%			2.82E-07	1.23E-06	**2.82E-07**	**1.23E-06**	Note 4
Manganese (Mn)	7439-96-5	0.8650%			1.34E-04	5.87E-04	**1.34E-04**	**5.87E-04**	Note 4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0375%			5.81E-06	2.54E-05	**5.81E-06**	**2.54E-05**	Note 4
Selenium (Se)	7782-49-2	0.0019%			2.88E-07	1.26E-06	**2.88E-07**	**1.26E-06**	Note 4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
	Total HAPs	**1.05%**			1.62E-04	7.10E-04	1.62E-04	7.10E-04	

Note 4: Pace Analytical Report dated June 10, 2021 (Fettling)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
1 Tons/Year

Flow Diagram Designation
Machining Cartridge Collectors (CU13a-h)
CU13a-h

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Machining Cartridge Collectors (CU13a-h)

Control Device: Machining Cartridge Collectors (CU13a-h) Note 1,2,3
SCC Code:
Control Device Outlet: 0.001 gr/dscf
Airflow: 11,768 acfm
Stack Gas Temperature: 68 °F

Facility Process Name:	**Criteria Pollutants**								
Machining Cartridge Collectors (CU13a-h)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.101	0.101	0.101						
Annual (TPY)	**0.443**	**0.443**	**0.443**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.101	0.101	0.101						
Annual (TPY)	**0.443**	**0.443**	**0.443**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Control device emits into plant environment as fugitive emissions.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Emissions are captured and emitted via Paint Line #1 Booth Filter (CU17) stack (ST15c)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Machining Cartridge Collectors (CU13a-h)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 3,4
Arsenic (As)	7440-38-2	0.0019%			1.96E-06	8.60E-06	**1.96E-06**	**8.60E-06**	Note 3,4
Beryllium (Be)	7440-41-7								Note 3,4
Cadmium (Cd)	7440-43-9	0.0001%			8.74E-08	3.83E-07	**8.74E-08**	**3.83E-07**	Note 3,4
Chromium (Cr)	7440-47-3	0.1360%			1.38E-04	6.03E-04	**1.38E-04**	**6.03E-04**	Note 3,4
Cobalt (Co)	7440-48-4	0.0026%			2.63E-06	1.15E-05	**2.63E-06**	**1.15E-05**	Note 3,4
Lead (Pb)	7439-92-1	0.0018%			1.84E-06	8.07E-06	**1.84E-06**	**8.07E-06**	Note 3,4
Manganese (Mn)	7439-96-5	0.8650%			8.76E-04	3.84E-03	**8.76E-04**	**3.84E-03**	Note 3,4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0375%			3.80E-05	1.66E-04	**3.80E-05**	**1.66E-04**	Note 3,4
Selenium (Se)	7782-49-2	0.0019%			1.88E-06	8.25E-06	**1.88E-06**	**8.25E-06**	Note 3,4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
	Total HAPs	**1.05%**			1.06E-03	4.64E-03	1.06E-03	4.64E-03	

Note 4: Pace Analytical Report dated June 10, 2021 (Fettling)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
1 Tons/Year

Flow Diagram Designation
Machining Cartridge Collectors (CU13i-j)
CU13i-j

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Machining Cartridge Collectors (CU13i-j)

Control Device: Machining Cartridge Collectors (CU13i-j) Note 1,2,3
SCC Code:
Control Device Outlet: 0.001 gr/dscf
Airflow: 11,768 acfm
Stack Gas Temperature: 68 °F

Facility Process Name:	**Criteria Pollutants**								
Machining Cartridge Collectors (CU13i-j)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.101	0.101	0.101						
Annual (TPY)	**0.443**	**0.443**	**0.443**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.101	0.101	0.101						
Annual (TPY)	**0.443**	**0.443**	**0.443**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Control device emits into plant environment as fugitive emissions.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Emissions are captured and emitted via Paint Line #1 Booth Filter (CU17) stack (ST15c)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Machining Cartridge Collectors (CU13i-j)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 3,4
Arsenic (As)	7440-38-2	0.0019%			1.96E-06	8.60E-06	**1.96E-06**	**8.60E-06**	Note 3,4
Beryllium (Be)	7440-41-7								Note 3,4
Cadmium (Cd)	7440-43-9	0.0001%			8.74E-08	3.83E-07	**8.74E-08**	**3.83E-07**	Note 3,4
Chromium (Cr)	7440-47-3	0.1360%			1.38E-04	6.03E-04	**1.38E-04**	**6.03E-04**	Note 3,4
Cobalt (Co)	7440-48-4	0.0026%			2.63E-06	1.15E-05	**2.63E-06**	**1.15E-05**	Note 3,4
Lead (Pb)	7439-92-1	0.0018%			1.84E-06	8.07E-06	**1.84E-06**	**8.07E-06**	Note 3,4
Manganese (Mn)	7439-96-5	0.8650%			8.76E-04	3.84E-03	**8.76E-04**	**3.84E-03**	Note 3,4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0375%			3.80E-05	1.66E-04	**3.80E-05**	**1.66E-04**	Note 3,4
Selenium (Se)	7782-49-2	0.0019%			1.88E-06	8.25E-06	**1.88E-06**	**8.25E-06**	Note 3,4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
	Total HAPs	**1.05%**			1.06E-03	4.64E-03	1.06E-03	4.64E-03	

Note 4: Pace Analytical Report dated June 10, 2021 (Fettling)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
MMCF/Year

Flow Diagram Designation
Paint Line #3 Booth Filter (CU14)
CU14

Maximum Hourly Capacity
MMCF/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #3 Booth Filter (CU14)

Control Device: Paint Line #3 Booth Filter (CU14)
SCC Code:
Control Device Outlet: 0.001 gr/dscf
Airflow: 2,750 acfm
Stack Gas Temperature: 82 °F

Facility Process Name:	**Criteria Pollutants**								
Paint Line #3 Booth Filter (CU14)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.023	0.023	0.023						
Annual (TPY)	**0.101**	**0.101**	**0.101**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.023	0.023	0.023						
Annual (TPY)	**0.101**	**0.101**	**0.101**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: None

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #3 Booth Filter (CU14)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
MMCF/Year

Flow Diagram Designation
Paint Line #2 Booth Filter (CU15)
CU15

Maximum Hourly Capacity
MMCF/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #2 Booth Filter (CU15)
Control Device: Paint Line #2 Booth Filter (CU15)
SCC Code:
Control Device Outlet: 0.001 gr/dscf
Airflow: 2,750 acfm
Stack Gas Temperature: 82 °F

Facility Process Name:	**Criteria Pollutants**								
Paint Line #2 Booth Filter (CU15)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.023	0.023	0.023						
Annual (TPY)	**0.101**	**0.101**	**0.101**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.023	0.023	0.023						
Annual (TPY)	**0.101**	**0.101**	**0.101**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: None

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #2 Booth Filter (CU15)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
MMCF/Year

Flow Diagram Designation
Paint Line #1 Booth Filter (CU17)
CU17

Maximum Hourly Capacity
MMCF/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #1 Booth Filter (CU17)

Control Device: Paint Line #1 Booth Filter (CU17)
SCC Code:
Control Device Outlet: 0.0015 gr/dscf
Airflow: 20,310 acfm
Stack Gas Temperature: 75 °F

Facility Process Name:	**Criteria Pollutants**								
Paint Line #1 Booth Filter (CU17)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.259	0.259	0.259						
Annual (TPY)	**1.133**	**1.133**	**1.133**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.259	0.259	0.259						
Annual (TPY)	**1.133**	**1.133**	**1.133**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: None

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #1 Booth Filter (CU17)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
MMCF/Year

Flow Diagram Designation
Core Silica Sand Silo A Bin Vent Filter (CU19)
CU19

Maximum Hourly Capacity
MMCF/Hour

Process Description:
Fritz Winter North America, LP
Core Silica Sand Silo A Bin Vent Filter (CU19)

Control Device: Core Silica Sand Silo A Bin Vent Filter (CU19) Note 1,2,3
SCC Code:
Control Device Outlet: 0.003 gr/dscf
Airflow: 600 acfm
Stack Gas Temperature: 68 °F

Facility Process Name:	**Criteria Pollutants**								
Core Silica Sand Silo A Bin Vent Filter (CU19)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.001**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.001**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE

Note 4 1.25 HRS/DAY
Note 4 125 HRS/YEAR

Note 1: Control device emits into plant environment as fugitive emissions.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Emissions are captured and emitted via Core/Mold Baghouse (CU08) stack (ST09)
Note 4: Pnuematic conveying of sand from truck to silo is approximately 1.25 hrs/day, 2 days/week, 50 weeks/yr

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Silica Sand Silo A Bin Vent Filter (CU19)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
MMCF/Year

Flow Diagram Designation
Core Silica Sand Silo B Bin Vent Filter (CU20)
CU20

Maximum Hourly Capacity
MMCF/Hour

Process Description:
Fritz Winter North America, LP
Core Silica Sand Silo B Bin Vent Filter (CU20)

Control Device: Core Silica Sand Silo B Bin Vent Filter (CU20) Note 1,2,3
SCC Code:
Control Device Outlet: 0.003 gr/dscf
Airflow: 600 acfm
Stack Gas Temperature: 68 °F

Facility Process Name:	**Criteria Pollutants**								
Core Silica Sand Silo B Bin Vent Filter (CU20)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.001**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.001**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE

Note 4 1.25 HRS/DAY
Note 4 125 HRS/YEAR

Note 1: Control device emits into plant environment as fugitive emissions.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Emissions are captured and emitted via Core/Mold Baghouse (CU08) stack (ST09)
Note 4: Pnuematic conveying of sand from truck to silo is approximately 1.25 hrs/day, 2 days/week, 50 weeks/yr

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Silica Sand Silo B Bin Vent Filter (CU20)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Snag Grinder #1 Fabric Filter (CU21)
CU21

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Snag Grinder #1 Fabric Filter (CU21)

Control Device:	Snag Grinder #1 Fabric Filter (CU21)	Note 1,2,3
SCC Code:		
Control Device Outlet:	0.003 gr/dscf	
Airflow:	1,500 acfm	
Stack Gas Temperature:	68 °F	

Facility Process Name:	**Criteria Pollutants**								
Snag Grinder #1 Fabric Filter (CU21)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.039	0.039	0.039						
Annual (TPY)	**0.170**	**0.170**	**0.170**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.039	0.039	0.039						
Annual (TPY)	**0.170**	**0.170**	**0.170**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Control device emits into plant environment as fugitive emissions.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Emissions are captured and emitted via Fettling Baghouse (CU11) stack (ST12)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Snag Grinder #1 Fabric Filter (CU21)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 3,4
Arsenic (As)	7440-38-2								Note 3,4
Beryllium (Be)	7440-41-7								Note 3,4
Cadmium (Cd)	7440-43-9								Note 3,4
Chromium (Cr)	7440-47-3								Note 3,4
Cobalt (Co)	7440-48-4								Note 3,4
Lead (Pb)	7439-92-1								Note 3,4
Manganese (Mn)	7439-96-5								Note 3,4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								Note 3,4
Selenium (Se)	7782-49-2								Note 3,4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
Total HAPs									

Note 4: Pace Analytical Report dated June 10, 2021 (Fettling)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Snag Grinder #2 Fabric Filter (CU22)
CU22

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Snag Grinder #2 Fabric Filter (CU22)

Control Device:	Snag Grinder #2 Fabric Filter (CU22)	Note 1,2,3
SCC Code:		
Control Device Outlet:	0.003 gr/dscf	
Airflow:	1,500 acfm	
Stack Gas Temperature:	68 °F	

Facility Process Name:	**Criteria Pollutants**								
Snag Grinder #2 Fabric Filter (CU22)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.039	0.039	0.039						
Annual (TPY)	**0.170**	**0.170**	**0.170**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.039	0.039	0.039						
Annual (TPY)	**0.170**	**0.170**	**0.170**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Control device emits into plant environment as fugitive emissions.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Emissions are captured and emitted via Fettling Baghouse (CU11) stack (ST12)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
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Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Snag Grinder #2 Fabric Filter (CU22)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 3,4
Arsenic (As)	7440-38-2								Note 3,4
Beryllium (Be)	7440-41-7								Note 3,4
Cadmium (Cd)	7440-43-9								Note 3,4
Chromium (Cr)	7440-47-3								Note 3,4
Cobalt (Co)	7440-48-4								Note 3,4
Lead (Pb)	7439-92-1								Note 3,4
Manganese (Mn)	7439-96-5								Note 3,4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								Note 3,4
Selenium (Se)	7782-49-2								Note 3,4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
Total HAPs									

Note 4: Pace Analytical Report dated June 10, 2021 (Fettling)

Appendix D
Safety Data Sheets

1. Silica Sand
2. Bentonite
3. Premix
4. Zip-Slip LR57HP (Mold Release)
5. Isocure Focus I 109
6. Isocure Focus II 209
7. Isocure Catalyst 706
8. ACMOS 118-63 (Core Release)
9. HA NixStix CB/NB Fast Dry (Core Release)
10. ASK Kerntop WV 031 111 Coating IBC716 FW (Core Release)
11. Castrol Rustilo 4175 (Rust Preventative)
12. Worwag Zinc Dust (SDS)
13. Worwag Zinc Dust (EDS)
14. Worwag Reducer (SDS)
15. Worwag Reducer (TDS)
16. Geomet 360 (SDS)
17. Geomet 360 (AQS)
18. Deionized Water
19. Diesel Fuel

A.F. Gelhar Co., Inc.
Sand for Industry Since 1919

Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: **Silica Sand**
Formula: SiO_2
CAS No.: 14808-60-7
Recommended Use: Foundry and proppant sand

Company Identification: **A.F. Gelhar Co., Inc.**
N2402 County Road A
Fairwater, Wisconsin 53931
920-398-3566 (7:30 am - 5 pm central time)

2. HAZARDS IDENTIFICATION

GHS Classification
Carc. 1A H350
STOT SE 3 H335
STOT RE 1 H372

GHS Labeling
Symbol:

GHS07

GHS08

Signal Word: **DANGER**

Hazard Statements:
H320 Causes eye irritation.
H335 May cause respiratory irritation
H350 May cause cancer by inhalation.
H372 Causes damage to organs (lungs/respiratory system) through prolonged or repeated exposure by inhalation.

Precautionary Statements:
P202 Do not handle until the safety information presented in this SDS has been read and understood.
P260 DO NOT BREATHE DUST.
P270 Do not eat, drink or smoke while handling this product.
P280 Wear eye protection, protective clothing, protective gloves
P264 Wash skin thoroughly after handling.
P304/P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P308/P313 IF exposed or concerned: Get medical advice/attention
P312 Call POISIN CENTER/doctor if you feel unwell
P403/P233 Store in a well ventilated place. Keep container tightly closed
P501 Dispose of contents/containers according to local, regional, national, and international regulations

Avoid creating dust when handling, using or storing. Use with adequate ventilation to keep exposure below recommended exposure limits. Wear eye protection and respiratory protection following this SDS, NIOSH guidelines and other applicable regulations.

Hazards Not Otherwise Classified:
No additional information available

OSHA Hazards
No additional information available

Target Organs
Lungs

Potential Immediate Health Effects
No additional information available

3. COMPOSITION

Substances:

Names	Product Identifier	Composition %	GHS-US classification
Silica Quartz	CAS# 14808-60-7	96 - 99.6	Carc. 1A, H350 STOT SE 3, H335 STOT RE 1, H372

Mixtures:
Not applicable

4. FIRST AID MEASURES

Description of first aid measures:

First-aid measures general:	If medical advice is needed, have product container or label at hand.
First-aid measures after inhalation:	If inhaled, remove to fresh air and keep at rest in a position comfortable for breathing. Obtain medical attention if breathing difficulty persists
First-aid measures after skin contact:	Rinse immediately with plenty of water. Gently wash with plenty of soap and water. Obtain medical attention if irritation persists.
First-aid measures after eye contact:	Immediately rinse with water for a prolonged period while holding the eyelids wide open. Seek medical attention if material is embedded in eye. If eye irritation persists: Get medical advice and
First-aid measures after ingestion:	If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

Symptoms & side effects:

Symptoms/injuries:	Repeated or prolonged inhalation may damage lungs.
Symptoms/injuries after inhalation:	May cause irritation to the respiratory tract, sneezing, coughing, burning sensation of throat with constricting sensation of the larynx and difficulty in breathing.
Symptoms/injuries after skin contact:	Prolonged contact with large amounts of dust may cause mechanical irritation. Dust may cause irritation in skin folds or by contact in combination with tight clothing.
Symptoms/injuries after eye contact:	Redness, pain.
Symptoms/injuries after ingestion:	Abdominal pain.
Chronic symptoms:	Respiratory difficulties. May cause cancer.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media:
Material is not flammable

Unsuitable Extinguishing Media:
Material is not flammable

Special Protective Equipment for Fire-Fighters:
Material is not flammable

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:

General measures:	Do not breathe dust. Avoid generation of dust during clean-up of spills. Recover the product by vacuuming, shoveling or sweeping. Vacuum must be fitted with HEPA filter to prevent release of particulates during clean-up.
Protective equipment:	Wear suitable protective clothing, gloves and eye/face protection. Use recommended respiratory protection.
Emergency procedures:	Collect as solid.

Environmental Precautions:
No additional information is available.

Methods and Materials for Containment and Clean-up

Methods for cleaning up:	Avoid generation of dust during clean-up of spills. Recover the product by vacuuming, shoveling or sweeping. Vacuum must be fitted with HEPA filter to prevent release of particulates during clean-up.

7. HANDLING AND STORAGE

Precautions for Safe Handling:

Additional hazards when processed:	Do not breathe dust.
Precautions for safe handling:	Avoid creating or spreading dust
Hygiene measures:	Handle in accordance with good industrial hygiene and safety procedures. Always wash your hands immediately after handling this product, and once again before leaving the workplace. Do not eat, drink or smoke in areas where product is used.

Recommended Conditions for Storage

Storage conditions:	Store in a dry, cool place. Keep container tightly closed.
Incompatible materials:	In finely divided state: reacts with (strong) oxidizers such as: hydrofluoric acid, chlorine trifluoride, oxygen difluoride, fluorine.
Special rules on packaging:	Keep container closed when no in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure limits:

Chemical	CAS No.	ACGIH TWA (mg/m^3)	US IDHL (mg/m^3)	USA NIOSH REL TWA (mg/m^3)	USA OSHA PEL TWA (mg/m^3)
Quartz	14808-60-7	0.025	50	0.05	(30)/(%SiO2 + 2) = mg/m^3 total dust (10)/(%SiO2 + 2) = mg/m^3 respirable

Engineering controls:
Ensure adequate ventilation, especially in confined areas. Avoid dust production.

Personal protective equipment:
In case of dust production: dustproof clothing. In case of dust production: protective goggles. Insufficient ventilation: wear respiratory protection. High dust production: self-contained breathing apparatus.

Hand Protection:
Impermeable protective gloves.

Skin and Body Protection:
Handle in accordance with good industrial hygiene and safety practice. Always wash your hands immediately after handling this product, and once again before leaving the workplace. Wear suitable protective clothing. Wash contaminated clothing before reuse.

Eye protection:
Protective goggles.

Respiratory protection:
Use NIOSH-approved air-purifying or supplied-air respirator where airborne concentrations of dust are expected to exceed exposure limits.

Consumer exposure controls:
Do not breathe dust. Wear recommended personal protective equipment.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Solid
Odor:	Odorless
Odor threshold:	No data available
pH:	No data available
Melting Point:	No data available
Freezing Point:	No data available
Evaporation Rate:	No data available
Flammability:	No data available
Explosion Limits:	No data available
Vapor Pressure:	No data available
Vapor Density:	No data available
Specific Gravity:	No data available
Solubility in Water:	No data available
Partition coefficient:	No data available
Auto-ignition temp.:	No data available
Decomposition temp.:	No data available
Viscosity:	No data available
Other:	No data available

10. STABILITY AND REACTIVITY

Chemical stability:
Stable under normal temperature and pressure:

Conditions to Avoid:
None known.

Hazardous Decomposition Products:
Quartz (silica) will dissolve in hydrofluoric acid producing corrosive gas, silicon tetrafluoride.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity:
Not classified.

Skin corrosion/irritation:
Not classified.

Serious eye damage/irritation:
Not classified.

Respiratory of skin sensitization:
Not classified.

Germ cell mutagenicity:
Not classified.

Carcinogenicity:
May cause cancer (inhalation).

Quartz Cas 14808-60-7

IRAC group:	Group 1
National Toxicity Program (NTP) Status:	Known Human Carcinogen

Reproductive toxicity:
Not classified.

Specific target organ toxicity (single exposure):
May cause respiratory irritation.

Specific target organ toxicity (repeated exposure):
Causes damage to organs (lung/respiratory) through prolonged or repeated exposure (inhalation).

Additional information:
Repeated or prolonged exposure to respirable crystalline silica dust will cause lung damage in the form of silicosis. Symptoms will include progressively more difficult breathing, cough, fever, and weight loss. Acute silicosis can be fatal.

Aspiration Hazard:
Not classified

12. ECOLOGICAL INFORMATION

Toxicity:
No additional information available.

Persistence and Degradability:
Not readily biodegradable.

Bioaccumulative Potential:
Not expected to bioaccumulate.

Mobility:
No additional information available.

PBT and vPvB assessment:
No additional information available.

Other Adverse Effects
No additional information available.

13. DISPOSAL CONSIDERATIONS

Regional legislation (waste):
Disposal must nbe done in accordance to local, state, and federal regulations

Waste Disposal recommendations:
Not a hazardous waste, per RCRA.

14. TRANSPORT INFORMATION

DOT (US):
Not applicable

IMDG:
Not applicable

IATA:
Not applicable

15. REGULATORY INFORMATION

SARA 302 Compounds
No SARA 302 chemicals present

SARA 313 Compounds
No SARA 313 chemicals present

SARA 311/312 Hazards
Immediate (acute) health hazard.
Delayed (chronic) health hazard.

TSCA listed substances:
Quartz CAS #14808-60-7

National regulations:
Quartz CAS #14808-60-7
Listed on IARC (International Agency for Research on Cancer)
Listed as carcinogen on NTP (National Toxicology Program)

US State Regulations
U.S. - California - Proposition 65 – Carcinogen
WARNING! This product contains Quartz, a substance known to the State of California to cause cancer.

U.S. - Hawaii - Occupational Exposure Limits - TWAs
U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Acceptable Ambient Concentrations
U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Emission Levels (ELs)
U.S. - Idaho - Occupational Exposure Limits - Mineral Dusts
U.S. - Illinois - Toxic Air Contaminant Carcinogens Permissible Exposure Limits - TWAs
U.S. - Maine - Chemicals of High Concern U.S. - Massachusetts - Right To Know List
U.S. - Michigan - Occupational Exposure Limits - TWAs
U.S. - Minnesota - Chemicals of High Concern
U.S. - Minnesota - Hazardous Substance List
U.S. - Minnesota - Permissible Exposure Limits - TWAs
U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - 24-Hour
U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - Annual
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New Jersey - Special Health Hazards Substances List
U.S. - Oregon - Permissible Exposure Limits - Mineral Dusts
U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Tennessee - Occupational Exposure Limits - TWAs
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term Washington -
U.S. - Vermont - Permissible Exposure Limits - TWAs
U.S. - Washington - Permissible Exposure Limits - STELs U.S. - STELS
U.S. - Washington - Permissible Exposure Limits - STELs U.S. - TWAs

16. OTHER INFORMATION

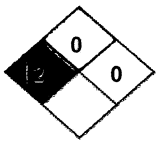
HMIS Classification:

Health Hazard:	2
Chronic Health Hazard:	-
Flammability:	0
Physical Hazards:	0
Personal Protection:	E

(Safety glasses, gloves, and dust respirator)

NFPA Rating:

Health Hazard:	2
Fire:	0
Reactivity Hazard:	0
Special Hazard:	None



Full text of H- phrases:

Carc. 1A	Carcinogenicity Category 1A
STOT RE 1	Specific target organ toxicity (repeated exposure) Category 1
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H335	May cause respiratory irritation
H350	May cause cancer
H372	Causes damage to organs through prolonged or repeated exposure

No data is available, per 29 CFR 1910.1200(d)(b); health hazards are based upon all of the components which make up the mixture.

The above information is believed to be correct, but is not purported to be all-inclusive and should only be used as a guide. Because data, safety standards, and regulatory inputs are subject to change, no warranty, guarantee, or representation with respect to the completeness or continuing accuracy of the information contained in this document is made. The user of this product must decide what safety measures are necessary to safely use this product; the conditions of handling and use, or misuse, are beyond the control of A.F. Gelhar Co., Inc.. The user is also responsible to determine its environmental regulatory compliance obligations under any applicable federal or state laws.

IMERYS
Metalcasting Solutions

SAFETY DATA SHEET

Product Trade Name: **IKOQUICK® Grade Bentonite**

Revision Date: 30-Aug-2016

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name:	IKOQUICK® Grade Bentonite
Synonyms:	None
Chemical Family:	Mineral
Application:	Additive
Manufacturer/Supplier	**S&B Industrial Minerals NA, Inc.** 100 Mansell Ct., Suite 300, Roswell, GA30076 Telephone: (319) 235-1900 Fax: (319) 232-7966 Emergency Telephone: (800) 424-9300 Call Chemtrec
Prepared By	EHS&Q Coordinator Telephone: 1-319-235-1900

2. HAZARD(S) IDENTIFICATION

Classification:	STOT RE1
Signal Word:	**DANGER**
Hazard Statement:	Causes damage to lungs through prolonged or repeated exposure via inhalation.
Precautionary statements:	Do not breathe dust In case of inadequate ventilation wear respiratory protection Dispose of contents/containers in accordance with local regulation
Other:	Long term exposure can cause lung injury (silicosis). IARC and NTP have determined that crystalline silica inhaled from occupational sources can cause cancer in humans. Risk of injury is dependent on the duration and level of exposure.

3. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Bentonite	1302-78-9	> 75%		5 mg/m^3 Respirable Dust 15 mg/m^3 Total Dust
Calcium Carbonate	1317-65-3	3 – 15%	10 mg/m^3	5 mg/m^3 Respirable Dust 15 mg/m^3 Total Dust
Graphite	7782-42-5	1 - 5%	2 mg/m^3	15 mppcf
Crystalline Silica in the form of Quartz (Naturally Occurring) Total Dust Respirable	14808-60-7	< 2.0%	0.025 mg/m^3	<u>30 mg/m^3</u> %SiO2 + 2 <u>10 mg/m^3</u> %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flash Point/Range (F): Not Determined
Flash Point/Range (C): Not Determined
Flash Point Method: Not Determined
Autoignition Temperature (F): Not Determined
Autoignition Temperature (C): Not Determined
Flammability Limits in Air - Lower (%): Not Determined
Flammability Limits in Air - Upper (%): Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Use with adequate ventilation to keep exposures below recommended limits. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Health 1*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	This product contains quartz, which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Wash hands after use. Material is slippery when wet.
Storage Information	Store away from oxidizers. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 3.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Protective gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Tan, Light Grey
Odor:	Odorless
pH:	7 – 10.5
Specific Gravity @ 20 C (Water=1):	1.7 – 2.65
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	44 - 58
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of Carbon. Carbon monoxide and carbon dioxide. Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).

Additional Guidelines Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Rout of Exposure	Eye or skin contact, inhalation
Inhalation	Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC Group 2A).
Skin Contact	May cause mechanical skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	None Known
Aggravated Medical Conditions	Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity Cancer Status: In 2011, The International Agency for Research on Cancer (IARC) concluded that crystalline silica in the form of quartz or cristobalite dust is carcinogenic to humans (IARC Group 1). Prolonged inhalation of silica dust may result in silicosis, a progressive, disabling, and sometimes fatal, lung disease. Avoid creating dusty conditions and use a NIOSH/MSHA approved dust respirator when Threshold limit Values (TLVs) may be exceeded.

Other Information

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 100 volume C (2011).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation
ICAO/IATA Not restricted

Sea Transportation
IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not Applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this SDS
Section 1

Additional Information

For additional information on the use of this product, contact your local Metalcasting Performance Additives representative.

For questions about the Safety Data Sheet for this or other Metalcasting Performance Additives products, contact EHS&Q Coordinator at 1-319-235-1900.

Disclaimer Statement

As of the date of preparation of this document, the forgoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state law(s). This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF SDS*****

IMERYS
Metalcasting Solutions

SAFETY DATA SHEET

Product Trade Name: **IKOQUICK PM1 PREMIX™ FRITZ WINTER**

Revision Date: 20-SEP-2016

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name:	IKOQUICK PM1 Premix™ FRITZ WINTER
Synonyms:	None
Chemical Family:	Mineral
Application:	Additive
Manufacturer/Supplier	S&B Industrial Minerals N.A., Inc. 100 Mansell Ct., Roswell, GA 30076 Telephone: (319) 235-1900 Fax: (319) 232-7966 Emergency Telephone: (800) 424-9300 Call Chemtrec
Prepared By	EHS&Q Coordinator Telephone: 1-319-235-1900

2. HAZARDS IDENTIFICATION

Classification: STOT RE1

Signal Word: **DANGER**

Hazard Statement: Causes damage to lungs through prolonged or repeated exposure via inhalation.

Precautionary statements:
Do not breathe dust
In case of inadequate ventilation wear respiratory protection
Dispose of contents/containers in accordance with local regulation

Other: Long term exposure can cause lung injury (silicosis). IARC and NTP have determined that crystalline silica inhaled from occupational sources can cause cancer in humans. Risk of injury is dependent on the duration and level of exposure.

3. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Bentonite	1302-78-9	61% - 71%		Particulates Not Otherwise Regulated Respirable dust 15 mg/m^3 Total dust 5 mg/m^3
Coal Dust (Quartz) Respirable Fraction < 5% SiO_2	68409-95-0	27% -33%	0.9 mg/m^3	2.4 mg/m^3
Graphite	7782-42-5	< 2%	2 mg/m^3	15 mppcf
Crystalline Silica in the form of Quartz(Naturally occurring) Respirable dust Total dust	14808-60-7	1 – 5%	0.025 mg/m^3	$\frac{10 \text{ mg/m}^3}{\%SiO2 +2}$ $\frac{30 \text{ mg/m}^3}{\%SiO2 + 2}$
Crystalline silica, cristobalite (Naturally occurring) Respirable dust	14464-46-1	0 -1%	0.025 mg/m^3	1/2 x $\frac{10 \text{ mg/m}^3}{\%SiO2 + 2}$

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flash Point/Range (F): Not Determined
Flash Point/Range (C): Not Determined
Flash Point Method: Not Determined
Autoignition Temperature (F): Not Determined
Autoignition Temperature (C): Not Determined
Flammability Limits in Air - Lower (%): Not Determined
Flammability Limits in Air - Upper (%): Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards	This product contains coal. At high temperatures toxic hydrocarbon gases may be formed; use with adequate ventilation to keep exposures below recommended limits. Good housekeeping practices are required to minimize this potential. Material becomes slippery when wet.
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Health 1*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	This product contains quartz, which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Wash hands after use. Material is slippery when wet.
Storage Information	Store away from oxidizers. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 3.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Impervious rubber gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Light Gray to Dark Gray
Odor:	Odorless
pH:	7 - 10
Specific Gravity @ 20 C (Water=1):	1.7 – 2.65
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	44 - 58
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Various oxides of Carbon, and possibly sulfur dioxide. At elevated temperatures toxic hydrocarbons may be formed.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Rout of Exposure	Eye or skin contact, inhalation
Inhalation	Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC Group 2A).
Skin Contact	May cause mechanical skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	None Known
Aggravated Medical Conditions	Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity Cancer Status: In 2011, The International Agency for Research on Cancer (IARC) concluded that crystalline silica in the form of quartz or cristobalite dust is carcinogenic to humans (IARC Group 1). Prolonged inhalation of silica dust may result in silicosis, a progressive, disabling, and sometimes fatal, lung disease. Avoid creating dusty conditions and use a NIOSH/MSHA approved dust respirator when Threshold limit Values (TLVs) may be exceeded.

Other Information

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 100 volume C (2011).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation
ICAO/IATA Not restricted

Sea Transportation
IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not Applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	Product contains one or more components not listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Sections 1,2,11,16

Additional Information

For additional information on the use of this product, contact your local Metalcasting Additives representative.

For questions about the Safety Data Sheet for this or other Metalcasting Additives products, contact EHS&Q Coordinator at 1-319-235-1900.

Disclaimer Statement

As of the date of preparation of this document, the forgoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state law(s). This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF SDS*****

ASKCHEMICALS
We advance your casting

Safety Data Sheet
ZIP-SLIP™ LR57HP RELEASE AGENT

Version 1.1 | Revision Date 02/08/2019 | Print Date 02/28/2020

SECTION 1. IDENTIFICATION

Product name : ZIP-SLIP™ LR57HP RELEASE AGENT
Material : 851625

Manufacturer or supplier's details

Company : ASK CHEMICALS LLC
Address : 495 Metro Place South Suite 250
Dublin, OH 43017
United States of America
Emergency telephone number : 1-855-ASK4YOU (1-855-275-4968)
E-mail address : EHSRequests.usa@ask-chemicals.com

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Not a hazardous substance or mixture.

GHS label elements

Not a hazardous substance or mixture.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous components

Chemical name	CAS-No.	Concentration (%)
DISTILLATES (PETROLEUM), HYDROTREATED HEAVY PARAFFINIC	64742-54-7	>= 90 - <= 100
OLEIC ACID	112-80-1	>= 5 - < 10

SECTION 4. FIRST AID MEASURES

General advice : Do not leave the victim unattended.

If inhaled : Remove person to fresh air. If signs/symptoms continue, get medical attention.

If unconscious place in recovery position and seek medical advice.
If symptoms persist, call a physician.

In case of skin contact : Flush skin with large amounts of water. If irritation develops and persists, get medical attention.

In case of eye contact : Flush eyes with water at least 15 minutes. Get medical attention if eye irritation develops or persists.

Remove contact lenses.
Protect unharmed eye.
If eye irritation persists, consult a specialist.

If swallowed : If swallowed, DO NOT induce vomiting unless directed to do so by medical personnel.

Keep respiratory tract clear.
Do not give milk or alcoholic beverages.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.

Most important symptoms and effects, both acute and delayed : None known.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Further information : Standard procedure for chemical fires.
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Special protective equipment for firefighters : Wear self contained breathing apparatus for fire fighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Methods and materials for containment and cleaning up : Wipe up with absorbent material (e.g. cloth, fleece).
Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion : Normal measures for preventive fire protection.

Advice on safe handling : For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the application area.

Conditions for safe storage : Electrical installations / working materials must comply with the technological safety standards.

Materials to avoid : No materials to be especially mentioned.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type	Control parame-	Basis

		(Form of exposure)	ters / Permissible concentration	
DISTILLATES (PETROLEUM), HYDROTREATED HEAVY PARAFFINIC	64742-54-7	TWA (Mist)	5 mg/m3	OSHA Z-1
		TWA (Inhalable fraction)	5 mg/m3	ACGIH
		TWA	5 mg/m3	OSHA P0
		TWA (Mist)	5 mg/m3	NIOSH REL
		ST (Mist)	10 mg/m3	NIOSH REL
		TWA (Mist)	5 mg/m3	OSHA P0
		PEL (particulate)	5 mg/m3	CAL PEL

Personal protective equipment

Respiratory protection : No personal respiratory protective equipment normally required.

Eye protection : Safety glasses

Skin and body protection : Protective suit

Hygiene measures : General industrial hygiene practice.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid

Colour : no data available

Odour : no data available

Odour Threshold : no data available

pH : no data available

Melting point : no data available

Boiling point : no data available

Flash point : 239 °C

Evaporation rate : no data available

Flammability (solid, gas) : no data available

Burning rate : no data available

Upper explosion limit : no data available

Lower explosion limit : no data available

Vapour pressure : no data available

Relative vapour density	:	no data available
Relative density	:	no data available
Density	:	0.846 g/cm3 (20 °C)
Bulk density	:	no data available
Solubility(ies)		
Water solubility	:	no data available
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Decomposition temperature	:	no data available
Viscosity		
Viscosity, dynamic	:	no data available
Viscosity, kinematic	:	no data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No decomposition if stored and applied as directed.
Chemical stability	:	Stable No decomposition if stored and applied as directed.
Possibility of hazardous reactions	:	Stable under recommended storage conditions. No hazards to be specially mentioned.
Conditions to avoid	:	no data available

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Components:

DISTILLATES (PETROLEUM), HYDROTREATED HEAVY PARAFFINIC:

Acute oral toxicity	:	LD50 (rat): > 15,000 mg/kg
Acute dermal toxicity	:	LD50 (rabbit): > 5,000 mg/kg

OLEIC ACID:

Acute oral toxicity	:	LD50 (rat): 25,000 mg/kg

Skin corrosion/irritation

Components:

DISTILLATES (PETROLEUM), HYDROTREATED HEAVY PARAFFINIC:
Assessment: Mild skin irritation
Result: Mild skin irritation

OLEIC ACID:
Assessment: Mild skin irritation
Result: Mild skin irritation

Serious eye damage/eye irritation

Components:

DISTILLATES (PETROLEUM), HYDROTREATED HEAVY PARAFFINIC:
Result: No eye irritation
Assessment: No eye irritation

OLEIC ACID:
Result: Mild eye irritation
Assessment: Mild eye irritation

Carcinogenicity

IARC	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Further information

Product:
Remarks: no data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity
No data available

Persistence and degradability
No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
Additional ecological information	:	no data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with all applicable local, state and federal regulations.
Contaminated packaging	:	Empty containers should be taken to an approved waste handling site for recycling or disposal.

SECTION 14. TRANSPORT INFORMATION

REGULATION
U.S. DOT - ROAD
Not regulated as a dangerous good

U.S. DOT - RAIL
Not regulated as a dangerous good

U.S. DOT - INLAND WATERWAYS
Not regulated as a dangerous good

TRANSPORT CANADA - ROAD
Not regulated as a dangerous good

TRANSPORT CANADA - RAIL
Not regulated as a dangerous good

TRANSPORT CANADA - INLAND WATERWAYS
Not regulated as a dangerous good

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES
Not regulated as a dangerous good

INTERNATIONAL MARITIME DANGEROUS GOODS
Not regulated as a dangerous good

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO
Not regulated as a dangerous good

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards	:	No SARA Hazards
SARA 302	:	This material does not contain any components with a section 302 EHS TPQ.
SARA 313	:	SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
California Prop 65		This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

The components of this product are reported in the following inventories:

TSCA	:	On TSCA Inventory
DSL	:	All components of this product are on the Canadian DSL.
AICS	:	On the inventory, or in compliance with the inventory
NZIoC	:	On the inventory, or in compliance with the inventory
ENCS	:	Not in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PICCS	:	On the inventory, or in compliance with the inventory
IECSC	:	On the inventory, or in compliance with the inventory

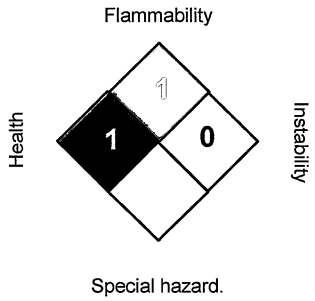
Inventories

AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TSCA (USA)

SECTION 16. OTHER INFORMATION

Further information

NFPA:



HMIS III:

HEALTH	1
FLAMMABILITY	1
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by ASK's Environmental Health and Safety Department-- EHSrequests.USA@ask-chemicals.com.

Revision Date : 02/08/2019

Safety Data Sheet
ISOCURE FOCUS I 109 BINDER TW936

SECTION 1. IDENTIFICATION

Product name	:	ISOCURE FOCUS I 109 BINDER TW936
Product code	:	R0389443
Material	:	769169

Manufacturer or supplier's details

Company	:	ASK Chemicals L.P.
Address	:	495 Metro Place South Suite 250 Dublin, OH 43017 United States of America
Emergency telephone number	:	1-855-ASK4YOU (1-855-275-4968)
E-mail address	:	EHSRequests.usa@ask-chemicals.com

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Skin irritation	:	Category 2
Serious eye damage	:	Category 1
Germ cell mutagenicity	:	Category 2
Specific target organ toxicity - repeated exposure	:	Category 2

GHS Label element

Hazard pictograms :

Signal word : Danger

Hazard statements : H315 Causes skin irritation.
H318 Causes serious eye damage.
H341 Suspected of causing genetic defects.
H373 May cause damage to organs through prolonged or repeated exposure.

Precautionary statements : **Prevention:**
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P280 Wear eye protection/ face protection.
P280 Wear protective gloves.
P281 Use personal protective equipment as required.
Response:
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water

for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P310 Immediately call a POISON CENTER or doctor/ physician.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P362 Take off contaminated clothing and wash before reuse.
Storage:
P405 Store locked up.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous components

Chemical Name	CAS-No.	Concentration (%)
DIMETHYL GLUTARATE	1119-40-0	>= 10 - < 20
RAPESEED OIL FATTY ACIDS, METHYL ESTERS	73891-99-3	>= 10 - < 20
DIMETHYL SUCCINATE	106-65-0	>= 5 - < 10
DIMETHYL ADIPATE	627-93-0	>= 5 - < 10
PHENOL	108-95-2	>= 1 - < 5
DIISOBUTYL PHTHALATE	84-69-5	>= 1 - < 5

SECTION 4. FIRST AID MEASURES

General advice	:	Consult a physician.
If inhaled	:	Remove person to fresh air. If signs/symptoms continue, get medical attention.
In case of skin contact	:	Take off contaminated clothing and shoes immediately. If on skin, rinse well with water. If on clothes, remove clothes.
In case of eye contact	:	Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
If swallowed	:	If swallowed, DO NOT induce vomiting unless directed to do so by medical personnel.
Most important symptoms and effects, both acute and delayed	:	None known.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Specific hazards during firefighting	:	Do not use a solid water stream as it may scatter and spread fire. Cool closed containers exposed to fire with water spray.
Special protective equipment for firefighters	:	In the event of fire, wear self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment. Ensure adequate ventilation. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Material can create slippery conditions.
Environmental precautions	:	Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	:	Keep in suitable, closed containers for disposal. Clean contaminated floors and objects thoroughly while observing environmental regulations.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling	:	Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
PHENOL	108-95-2	TWA	5 ppm	ACGIH
		TWA	5 ppm 19 mg/m3	NIOSH REL
		C	15.6 ppm 60 mg/m3	NIOSH REL
		TWA	5 ppm 19 mg/m3	OSHA Z-1
		TWA	5 ppm 19 mg/m3	OSHA P0

Personal protective equipment

Eye protection	:	Wear face-shield and protective suit for abnormal processing problems.

Proper eye protection according to ANSI Z87.1 must be worn.

Protective measures	:	Wear suitable protective equipment. Avoid contact with skin. When using do not eat, drink or smoke.
Hygiene measures	:	Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Remove contaminated clothing and protective equipment before entering eating areas.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Colour	:	amber
Odour	:	mild
Odour Threshold	:	no data available
pH	:	no data available
Melting point	:	no data available
Boiling point	:	181.75 °C (1,013 hPa) Calculated Phase Transition Liquid/Gas
Flash point	:	> 93.4 °C Method: Seta closed cup
Evaporation rate	:	no data available
Flammability (solid, gas)	:	no data available
Burning rate	:	no data available
Upper explosion limit	:	8.6 %(V) Calculated Explosive Limit
Lower explosion limit	:	0.9 %(V) Calculated Explosive Limit
Vapour pressure	:	3 hPa (25 °C) Calculated Vapor Pressure
Relative vapour density	:	no data available
Relative density	:	1.106 (77.00 °F)
Density	:	1.106 g/cm3 (77.00 °F)
Bulk density	:	no data available

Solubility(ies)
Water solubility : no data available

Solubility in other solvents : no data available

Partition coefficient: n-octanol/water : no data available

Auto-ignition temperature : no data available

Decomposition temperature : no data available

Viscosity
Viscosity, dynamic : 480 mPa.s

Viscosity, kinematic : no data available

SECTION 10. STABILITY AND REACTIVITY

Chemical stability : Stable

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Skin Absorption

Acute toxicity

Product:

Acute oral toxicity : Acute toxicity estimate: 2,806 mg/kg
Method: Calculation method

Acute inhalation toxicity : Acute toxicity estimate: 34.96 mg/l
Exposure time: 4 h
Test atmosphere: vapour
Method: Calculation method

Acute dermal toxicity : Acute toxicity estimate: > 5,000 mg/kg
Method: Calculation method

Components:

DIMETHYL GLUTARATE:
Acute oral toxicity : LD50 (rat): 8,191 mg/kg

Acute inhalation toxicity : LC50 (rat): > 5.6 mg/l
Exposure time: 4 h

RAPESEED OIL FATTY ACIDS, METHYL ESTERS:
Acute oral toxicity : LD50 (rat): > 2,000 mg/kg

DIMETHYL SUCCINATE:
Acute oral toxicity : LD50 (rat): > 5,000 mg/kg

Acute dermal toxicity : LD50 (rabbit): > 5,000 mg/kg

PHENOL:

Acute oral toxicity	:	LD50 (rat): 317 mg/kg Acute toxicity estimate: 100 mg/kg Method: Converted acute toxicity point estimate
Acute inhalation toxicity	:	LC50 (rat): 0.316 mg/l Exposure time: 4 h Test atmosphere: vapour
Acute dermal toxicity	:	LD50 (rabbit): 850 mg/kg Acute toxicity estimate: 300 mg/kg Method: Converted acute toxicity point estimate

DIISOBUTYL PHTHALATE:

Acute oral toxicity	:	LD50 (rat): 15,000 mg/kg LD50 (mouse): 12,800 mg/kg
Acute toxicity (other routes of administration)	:	LD 50 (Mouse): 4.5 g/kg Application Route: Intraperitoneal Remarks: This data record is no longer present in the Ariel database LD 50 (Rat): 3.8 g/kg Application Route: Intraperitoneal Remarks: This data record is no longer present in the Ariel database

Skin corrosion/irritation

Components:

DIMETHYL GLUTARATE:
Assessment: Irritating to skin.
Result: Irritating to skin.

RAPESEED OIL FATTY ACIDS, METHYL ESTERS:
Assessment: Mild skin irritation
Result: Mild skin irritation

DIMETHYL SUCCINATE:
Assessment: No skin irritation
Result: No skin irritation

DIMETHYL ADIPATE:
Assessment: Mild skin irritation
Result: Mild skin irritation

PHENOL:
Assessment: Corrosive
Result: Corrosive

Assessment: Severe skin irritation
Result: Severe skin irritation

DIISOBUTYL PHTHALATE:
Assessment: Mild skin irritation
Result: Mild skin irritation

Serious eye damage/eye irritation

Components:
DIMETHYL GLUTARATE:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

RAPESEED OIL FATTY ACIDS, METHYL ESTERS:
Result: No eye irritation
Assessment: No eye irritation

DIMETHYL SUCCINATE:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

DIMETHYL ADIPATE:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

PHENOL:
Result: Blindness
Assessment: Blindness

Result: Irritating to eyes.
Assessment: Irritating to eyes.

Result: Risk of serious damage to eyes.
Assessment: Risk of serious damage to eyes.

DIISOBUTYL PHTHALATE:
Result: Mild eye irritation
Assessment: Mild eye irritation

Carcinogenicity

IARC	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Further information

Components:
PHENOL:

Remarks: Central nervous system

Remarks: Blood

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

PHENOL:

Toxicity to fish : LC 50 (Rainbow trout,donaldson trout (Oncorhynchus mykiss)): 7.5 - 14 mg/l
Exposure time: 96 h
Method: Static
Remarks: Mortality

LC 50 (Danio rerio (zebra fish)): 27.8 mg/l
Exposure time: 96 h
Method: Static
Remarks: Mortality

Toxicity to daphnia and other aquatic invertebrates : EC 50 (Water flea (Daphnia magna)): 4.24 - 10.7 mg/l
Exposure time: 48 h
Method: Static
Remarks: Intoxication

Persistence and degradability

Components:

DIMETHYL SUCCINATE:

Biodegradability : Remarks: Readily biodegradable

Bioaccumulative potential

Components:

DIMETHYL SUCCINATE:

Partition coefficient: n-octanol/water : log Pow: 0.35

DIMETHYL ADIPATE:

Partition coefficient: n-octanol/water : log Pow: 1.03

PHENOL:

Partition coefficient: n-octanol/water : log Pow: 1.46

DIISOBUTYL PHTHALATE:

Partition coefficient: n-octanol/water : log Pow: 4.11

Mobility in soil

No data available

Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with all applicable local, state and federal regulations. Dispose of wastes in an approved waste disposal facility.

SECTION 14. TRANSPORT INFORMATION

REGULATION
U.S. DOT - ROAD
Not regulated as a dangerous good

U.S. DOT - RAIL
Not regulated as a dangerous good

U.S. DOT - INLAND WATERWAYS
Not regulated as a dangerous good

TRANSPORT CANADA - ROAD
Not regulated as a dangerous good

TRANSPORT CANADA - RAIL
Not regulated as a dangerous good

TRANSPORT CANADA - INLAND WATERWAYS
Not regulated as a dangerous good

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES
Not regulated as a dangerous good

INTERNATIONAL MARITIME DANGEROUS GOODS
Not regulated as a dangerous good

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO
Not regulated as a dangerous good

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
PHENOL	108-95-2	1000	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 304 Extremely Hazardous Substances Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
PHENOL	108-95-2	1000	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 311/312 Hazards : Acute Health Hazard

SARA 302 : The following components are subject to reporting levels established by SARA Title III, Section 302:

PHENOL 108-95-2 3.564 %

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

PHENOL 108-95-2 3.564 %

California Prop 65 WARNING! This product contains a chemical known to the State of California to cause cancer.

FORMALDEHYDE 50-00-0
ETHYL CARBAMATE 51-79-6

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

METHANOL 67-56-1
ETHYL CARBAMATE 51-79-6

The components of this product are reported in the following inventories:

TSCA : On TSCA Inventory
DSL : All components of this product are on the Canadian DSL.
AUSTR : On the inventory, or in compliance with the inventory
NZIOC : Not in compliance with the inventory
ENCS : Not in compliance with the inventory
KOREA : On the inventory, or in compliance with the inventory
PHIL : Not in compliance with the inventory
CHINA : On the inventory, or in compliance with the inventory

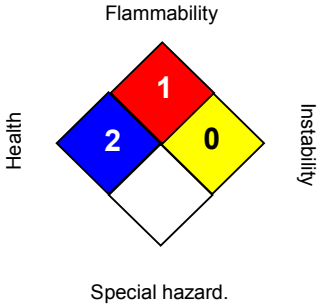
Inventories

AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TSCA (USA)

SECTION 16. OTHER INFORMATION

Further information

NFPA:



HMIS III:

HEALTH	2*
FLAMMABILITY	1
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by ASK's Environmental Health and Safety Department-- EHSrequests.USA@ask-chemicals.com.

Revision Date : 05/26/2015

Safety Data Sheet
ISOCURE FOCUS II 209 BINDER TW936

SECTION 1. IDENTIFICATION

Product name	:	ISOCURE FOCUS II 209 BINDER TW936
Product code	:	R0389447
Material	:	769170

Manufacturer or supplier's details

Company	:	ASK Chemicals L.P.
Address	:	495 Metro Place South Suite 250 Dublin, OH 43017 United States of America
Emergency telephone number	:	1-855-ASK4YOU (1-855-275-4968)
E-mail address	:	EHSRequests.usa@ask-chemicals.com

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Acute toxicity (Inhalation)	:	Category 4
Skin irritation	:	Category 2
Eye irritation	:	Category 2A
Respiratory sensitisation	:	Category 1
Skin sensitisation	:	Category 1

GHS Label element

Hazard pictograms :

Signal word : Danger

Hazard statements :
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Precautionary statements :
Prevention:
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P272 Contaminated work clothing should not be allowed out of the workplace.
P280 Wear eye protection/ face protection.
P280 Wear protective gloves.
P285 In case of inadequate ventilation wear respiratory protection.

Response:
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P342 + P311 If experiencing respiratory symptoms: Call a POISON CENTER or doctor/ physician.
P362 Take off contaminated clothing and wash before reuse.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous components

Chemical Name	CAS-No.	Concentration (%)
POLYMETHYLENE POLYPHENYL ISOCYANATE	9016-87-9	>= 30 - < 50
4,4'-DIPHENYLMETHANE DIISOCYANATE	101-68-8	>= 30 - < 50
RAPESEED OIL FATTY ACIDS, METHYL ESTERS	73891-99-3	>= 20 - < 30
METHYLENE DIPHENYLISOCYANATE	26447-40-5	>= 1 - < 5

SECTION 4. FIRST AID MEASURES

General advice	:	Consult a physician.
If inhaled	:	Call a physician or poison control centre immediately. If breathed in, move person into fresh air.
In case of skin contact	:	Take off contaminated clothing and shoes immediately. If on skin, rinse well with water. If on clothes, remove clothes.
In case of eye contact	:	Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
If swallowed	:	If swallowed, DO NOT induce vomiting unless directed to do so by medical personnel.
Most important symptoms and effects, both acute and delayed	:	None known.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Specific hazards during firefighting	:	Do not use a solid water stream as it may scatter and spread fire. Burning produces irritant fumes. Cool closed containers exposed to fire with water spray.
Further information	:	In the event of fire and/or explosion do not breathe fumes.
Special protective equipment for firefighters	:	In the event of fire, wear self-contained breathing apparatus. Exposure to decomposition products may be a hazard to health.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment. Ensure adequate ventilation. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Use the indicated respiratory protection if the occupational exposure limit is exceeded and/or in case of product release (dust). Material can create slippery conditions.
Environmental precautions	:	Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	:	Keep in suitable, closed containers for disposal. Clean contaminated floors and objects thoroughly while observing environmental regulations.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling	:	Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. In case of insufficient ventilation, wear suitable respiratory equipment.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis

4,4'-DIPHENYLMETHANE DIISOCYANATE	101-68-8	TWA	0.005 ppm	ACGIH
		TWA	0.005 ppm 0.05 mg/m3	NIOSH REL
		C	0.2 ppm 0.2 mg/m3	NIOSH REL
		C	0.02 ppm 0.2 mg/m3	OSHA Z-1
		C	0.02 ppm 0.2 mg/m3	OSHA P0

Personal protective equipment

Eye protection : Safety goggles

Protective measures : Wear suitable protective equipment.
Avoid contact with skin.
When using do not eat, drink or smoke.

Hygiene measures : Avoid contact with skin, eyes and clothing.
Wash hands before breaks and immediately after handling the product.
Remove contaminated clothing and protective equipment before entering eating areas.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid

Colour : brown

Odour : musty

Odour Threshold : no data available

pH : no data available

Melting point : no data available

Boiling point : 196 °C
(6.666 hPa)
Calculated Phase Transition Liquid/Gas

Flash point : > 93.4 °C

Evaporation rate : no data available

Flammability (solid, gas) : no data available

Burning rate : no data available

Upper explosion limit : no data available

Lower explosion limit : no data available

Vapour pressure : 3 hPa (25 °C)
Calculated Vapor Pressure

Relative vapour density	:	no data available
Relative density	:	1.145 (77.00 °F)
Density	:	1.145 g/cm3 (77.00 °F)
Bulk density	:	no data available
Solubility(ies)		
Water solubility	:	no data available
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Decomposition temperature	:	no data available
Viscosity		
Viscosity, dynamic	:	31 mPa.s
Viscosity, kinematic	:	no data available

SECTION 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable
Incompatible materials	:	water

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Inhalation
Skin Absorption

Acute toxicity

Product:

Acute inhalation toxicity	:	Acute toxicity estimate: 14.53 mg/l Exposure time: 4 h Test atmosphere: vapour Method: Calculation method

Components:

POLYMETHYLENE POLYPHENYL ISOCYANATE:

Acute oral toxicity	:	LD50 (rat): > 10,000 mg/kg
Acute inhalation toxicity	:	LC50 (rat): 0.369 - 0.49 mg/l Exposure time: 4 h

Acute dermal toxicity : LD50 (rabbit): > 10,000 mg/kg

LD50 (rabbit): 11,300 mg/kg

4,4'-DIPHENYLMETHANE DIISOCYANATE:
Acute oral toxicity : LD50 (rat): 9,200 mg/kg

Acute inhalation toxicity : LC50 (rat): > 2.24 mg/l
Exposure time: 1 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 403

Acute dermal toxicity : LD50 (rabbit): > 7,900 mg/kg

RAPESEED OIL FATTY ACIDS, METHYL ESTERS:
Acute oral toxicity : LD50 (rat): > 2,000 mg/kg

METHYLENE DIPHENYLISOCYANATE:
Acute oral toxicity : LD50 (rat): > 15,800 mg/kg

Acute inhalation toxicity : LC50 (rat): 0.49 mg/l
Exposure time: 4 h

Acute dermal toxicity : LD50 (rabbit): > 5,010 mg/kg

Skin corrosion/irritation

Components:
POLYMETHYLENE POLYPHENYL ISOCYANATE:
Assessment: Irritating to skin.
Result: Irritating to skin.

4,4'-DIPHENYLMETHANE DIISOCYANATE:
Assessment: Irritating to skin.
Result: Irritating to skin.

RAPESEED OIL FATTY ACIDS, METHYL ESTERS:
Assessment: Mild skin irritation
Result: Mild skin irritation

METHYLENE DIPHENYLISOCYANATE:
Assessment: Irritating to skin.
Result: Irritating to skin.

Serious eye damage/eye irritation

Components:
POLYMETHYLENE POLYPHENYL ISOCYANATE:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

4,4'-DIPHENYLMETHANE DIISOCYANATE:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

RAPESEED OIL FATTY ACIDS, METHYL ESTERS:
Result: No eye irritation
Assessment: No eye irritation

METHYLENE DIPHENYLISOCYANATE:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

Respiratory or skin sensitisation

Components:
POLYMETHYLENE POLYPHENYL ISOCYANATE:
Assessment: May cause sensitisation by skin contact.

Assessment: May cause sensitisation by inhalation.

4,4'-DIPHENYLMETHANE DIISOCYANATE:
Assessment: May cause sensitisation by inhalation.

Assessment: May cause sensitisation by skin contact.

METHYLENE DIPHENYLISOCYANATE:
Assessment: May cause sensitisation by inhalation.

Assessment: May cause sensitisation by skin contact.

Carcinogenicity

IARC	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Further information

Components:
4,4'-DIPHENYLMETHANE DIISOCYANATE:
Remarks: Lungs

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity
No data available

Persistence and degradability
No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with all applicable local, state and federal regulations. Dispose of wastes in an approved waste disposal facility.

SECTION 14. TRANSPORT INFORMATION

REGULATION
U.S. DOT - ROAD
Not regulated as a dangerous good

U.S. DOT - RAIL
Not regulated as a dangerous good

U.S. DOT - INLAND WATERWAYS
Not regulated as a dangerous good

TRANSPORT CANADA - ROAD
Not regulated as a dangerous good

TRANSPORT CANADA - RAIL
Not regulated as a dangerous good

TRANSPORT CANADA - INLAND WATERWAYS
Not regulated as a dangerous good

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES
Not regulated as a dangerous good

INTERNATIONAL MARITIME DANGEROUS GOODS
Not regulated as a dangerous good

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO

Not regulated as a dangerous good

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
4,4'-DIPHENYLMETHANE DIISOCYANATE	101-68-8	5000	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 304 Extremely Hazardous Substances Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
PHOSPHORUS OXYCHLORIDE	10025-87-3	1000	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 311/312 Hazards : Acute Health Hazard

SARA 302 : SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

POLYMETHYLENE POLYPHENYL ISOCYANATE	9016-87-9	37.85 %
4,4'-DIPHENYLMETHANE DIISOCYANATE	101-68-8	34.065 %

California Prop 65 This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

The components of this product are reported in the following inventories:

TSCA : On TSCA Inventory
DSL : This product contains the following components listed on the Canadian NDSL. All other components are on the Canadian DSL.
AUSTR : Not in compliance with the inventory
NZIOC : On the inventory, or in compliance with the inventory
ENCS : On the inventory, or in compliance with the inventory

KOREA	:	Not in compliance with the inventory
PHIL	:	On the inventory, or in compliance with the inventory
CHINA	:	Not in compliance with the inventory

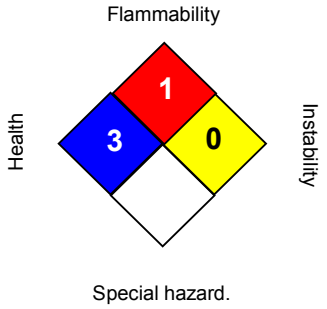
Inventories

AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TSCA (USA)

SECTION 16. OTHER INFORMATION

Further information

NFPA:



HMIS III:

HEALTH	2*
FLAMMABILITY	1
PHYSICAL HAZARD	1

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by ASK's Environmental Health and Safety Department-- EHSrequests.USA@ask-chemicals.com.

Revision Date : 05/26/2015

SECTION 1. IDENTIFICATION

Product name	:	ISOCURE™ 706 CATALYST
Material	:	590163

Manufacturer or supplier's details

Company	:	ASK Chemicals L.P.
Address	:	495 Metro Place South Suite 250 Dublin, OH 43017 United States of America
Emergency telephone number	:	1-855-ASK4YOU (1-855-275-4968)
E-mail address	:	EHSRequests.usa@ask-chemicals.com

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids	:	Category 2
Acute toxicity (Oral)	:	Category 4
Skin irritation	:	Category 2
Serious eye damage	:	Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H225 Highly flammable liquid and vapour.
H302 Harmful if swallowed.
H315 Causes skin irritation.
H318 Causes serious eye damage.

Precautionary statements : **Prevention:**
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P280 Wear protective gloves/ eye protection/ face protection.
Response:
P301 + P312 IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.

P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 Immediately call a POISON CENTER or doctor/ physician.
P330 Rinse mouth.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P362 Take off contaminated clothing and wash before reuse.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
Storage:
P403 + P235 Store in a well-ventilated place. Keep cool.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Hazardous components

Chemical name	CAS-No.	Concentration (%)
DIMETHYLPROPYLAMINE	926-63-6	>= 90 - <= 100

SECTION 4. FIRST AID MEASURES

General advice : Do not leave the victim unattended.

If inhaled : Remove person to fresh air. If signs/symptoms continue, get medical attention.

If unconscious place in recovery position and seek medical advice.
If symptoms persist, call a physician.

In case of skin contact : Flush skin with large amounts of water. If irritation develops and persists, get medical attention.

In case of eye contact : Remove contact lenses.
Protect unharmed eye.
If eye irritation persists, consult a specialist.

If swallowed : If swallowed, DO NOT induce vomiting unless directed to do so by medical personnel.

Keep respiratory tract clear.
Do not give milk or alcoholic beverages.
Never give anything by mouth to an unconscious person.

If symptoms persist, call a physician.

Most important symptoms and effects, both acute and delayed	:	None known.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Carbon dioxide (CO2) Alcohol-resistant foam Water spray Dry chemical
Further information	:	Standard procedure for chemical fires. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Special protective equipment for firefighters	:	Wear self contained breathing apparatus for fire fighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Methods and materials for containment and cleaning up	:	Neutralise with acid. Wipe up with absorbent material (e.g. cloth, fleece). Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion	:	Normal measures for preventive fire protection.
Advice on safe handling	:	For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area.
Conditions for safe storage	:	Electrical installations / working materials must comply with the technological safety standards.
Materials to avoid	:	No materials to be especially mentioned.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection	:	No personal respiratory protective equipment normally required.
Eye protection	:	Safety glasses

Skin and body protection	:	Protective suit
Hygiene measures	:	General industrial hygiene practice.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Colour	:	colourless
Odour	:	amine-like
Odour Threshold	:	no data available
pH	:	ca. 11.2, 5 % (20 °C)
Melting point	:	ca. -40 °C
Boiling point	:	66.3 °C
Flash point	:	-11 °C Method: Closed Cup
Evaporation rate	:	no data available
Flammability (solid, gas)	:	no data available
Burning rate	:	no data available
Upper explosion limit	:	no data available
Lower explosion limit	:	no data available
Vapour pressure	:	172 mmHg (25 °C) Method: OECD Test Guideline 104
Relative vapour density	:	> 1 (Air = 1.0)
Relative density	:	0.702 (25 °C)
Density	:	0.702 g/cm3 (25 °C)
Bulk density	:	no data available
Solubility(ies)		
Water solubility	:	soluble
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available

Auto-ignition temperature	:	165 °C
Decomposition temperature	:	no data available
Viscosity		
Viscosity, dynamic	:	0.36 mPa.s (20 °C)
Viscosity, kinematic	:	no data available
Molecular weight	:	87.16 g/mol

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No decomposition if stored and applied as directed.
Chemical stability	:	Stable
Possibility of hazardous reactions	:	Stable under recommended storage conditions.
Conditions to avoid	:	no data available
Incompatible materials	:	Acids

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Product:

Acute oral toxicity : LD 50 (Rat): 507 mg/kg

Components:

DIMETHYLPROPYLAMINE:

Acute oral toxicity : LD50 (rat): 507 mg/kg

Acute dermal toxicity : LD 50 (Rabbit): 650 mg/kg

Skin corrosion/irritation

Product:

Assessment: Irritating to skin
Result: Irritating to skin

Components:

DIMETHYLPROPYLAMINE:

Assessment: Irritating to skin.
Result: Irritating to skin.

Serious eye damage/eye irritation

Product:

Result: Severely irritating to eyes
Assessment: Severely irritating to eyes

Components:

DIMETHYLPROPYLAMINE:
Result: Risk of serious damage to eyes.
Assessment: Risk of serious damage to eyes.

Germ cell mutagenicity

Components:

DIMETHYLPROPYLAMINE:

Genotoxicity in vitro	:	Method: Mutagenicity (Escherichia coli - reverse mutation assay) Result: negative

Carcinogenicity

IARC	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Further information

Product:

Remarks: no data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

DIMETHYLPROPYLAMINE:

Toxicity to fish	:	LC 50 (Brachydanio rerio): > 100 mg/l

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
Additional ecological information	:	no data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with all applicable local, state and federal regulations.
Contaminated packaging	:	Empty containers should be taken to an approved waste handling site for recycling or disposal.

SECTION 14. TRANSPORT INFORMATION

REGULATION
U.S. DOT - ROAD

UN/ID/NA number	:	UN2266
Proper shipping name	:	Dimethyl-N-propylamine
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

U.S. DOT - RAIL

UN/ID/NA number	:	UN2266
Proper shipping name	:	Dimethyl-N-propylamine
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

U.S. DOT - INLAND WATERWAYS

UN/ID/NA number	:	UN2266

Proper shipping name	:	Dimethyl-N-propylamine
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

TRANSPORT CANADA - ROAD

UN/ID/NA number	:	UN2266
Proper shipping name	:	DIMETHYL-N-PROPYLAMINE
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

TRANSPORT CANADA - RAIL

UN/ID/NA number	:	UN2266
Proper shipping name	:	DIMETHYL-N-PROPYLAMINE
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

TRANSPORT CANADA - INLAND WATERWAYS

UN/ID/NA number	:	UN2266
Proper shipping name	:	DIMETHYL-N-PROPYLAMINE
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES

UN/ID/NA number	:	UN2266
Proper shipping name	:	DIMETIL-N-PROPILAMINA
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

INTERNATIONAL MARITIME DANGEROUS GOODS

UN/ID/NA number	:	UN2266
Proper shipping name	:	N,N-DIMETHYLPROPYLAMINE

Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO

UN/ID/NA number	:	UN2266
Proper shipping name	:	Dimethyl-N-propylamine
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards	:	Acute Health Hazard Fire Hazard
SARA 302	:	SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313	:	SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
California Prop 65		This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

The components of this product are reported in the following inventories:

TSCA	:	On TSCA Inventory
DSL	:	This product contains the following components listed on the Canadian NDSL. All other components are on the Canadian DSL.

AICS	:	Not in compliance with the inventory
NZIoC	:	Not in compliance with the inventory
ENCS	:	Not in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PICCS	:	On the inventory, or in compliance with the inventory
IECSC	:	Not in compliance with the inventory

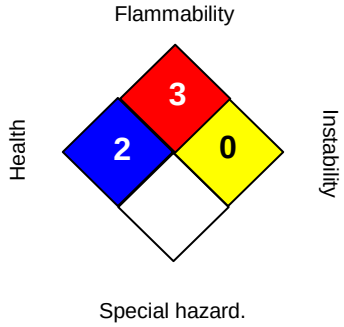
Inventories

AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TSCA (USA)

SECTION 16. OTHER INFORMATION

Further information

NFPA:



HMIS III:

HEALTH	2
FLAMMABILITY	3
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by ASK's Environmental Health and Safety Department-- EHSrequests.USA@ask-chemicals.com.

Revision Date : 04/05/2018

1. Identification

Product identifier

ACMOS 118-63

Recommended use of the chemical and restrictions on use

Relevant identified uses

Release agent for cold setting sand

Uses advised against

Consumer uses: Private households (= general public = consumers)
Sector of uses [SU]: 21
Do not use for private purposes (household).

Relevant identified uses - Further information:
Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of uses [SU]: 3
The product is intended for professional use.

Details of the supplier of the safety data sheet

Manufacturer

Company name:	ACMOS CHEMIE KG
Street:	Industriestrasse 49
Place:	D-28199 Bremen
Post-office box:	10 10 69 D-28010 Bremen
Telephone:	+49 (0)421-5189-0 Telefax: +49 (0)421-511415
e-mail:	acmos@acmos.com
Contact person:	Mr. Stephan Dryhaus
e-mail:	sds@acmos.com
Internet:	www.acmos.com
Responsible Department:	Laboratory (Division: Occupational- / Product security) - see under section 16
Emergency phone number:	01149 (0)551 19240 (Emergency information service / official advisory body: Giftinformationszentrum Nord, Universität Göttingen, 24 h from mo. - su.) Language(s) of Telephone Service: DE, EN

Supplier

Company name:	ACMOS CHEMIE KG
Street:	Industriestrasse 49
Place:	D-28199 Bremen
Post-office box:	10 10 69 D-28010 Bremen
Telephone:	+49 (0)421-5189-0 Telefax: +49 (0)421-511415
e-mail:	acmos@acmos.com
Contact person:	Mr. Stephan Dryhaus
e-mail:	sds@acmos.com
Internet:	www.acmos.com
Responsible Department:	Laboratory (Division: Occupational- / Product security) - see under section 16
Emergency phone number:	1-800-424-9300 (CHEMTREC - 24/7 - Within the USA and Canada) Language(s) of Telephone Service: EN, FR

2. Hazard(s) identification

Classification of the chemical

29 CFR Part 1910.1200

Flammable liquids: Flam. Liq. 2
Aspiration hazard: Asp. Tox. 1
Skin corrosion/irritation: Skin Irrit. 2
Specific target organ toxicity single exposure: STOT SE 3 (narcotic effects)

Label elements

29 CFR Part 1910.1200

Signal word: Danger

Pictograms:

Hazard statements

Highly flammable liquid and vapor
Causes skin irritation
May cause drowsiness or dizziness
May be fatal if swallowed and enters airways

Precautionary statements

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Avoid breathing spray.
Wash hands thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection.
If swallowed: Immediately call a poison center/doctor.
Do NOT induce vomiting.
If on skin: Wash with plenty of soap and water.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If skin irritation occurs: Get medical advice/attention.
Take off contaminated clothing and wash it before reuse.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Call a poison center/doctor if you feel unwell.
In case of fire: Use Water mist/Extinguishing powder/Foam/Carbon dioxide (CO2) to extinguish.
Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.
Dispose of contents/container to Disposal of contents/container in accordance with local/regional/national/international regulations..

Additional advice on labelling

Labeling according to the revised Hazard Communication Standard (HCS 2012) according to 29 CFR 1910.1200(f)

Hazards not otherwise classified

Adverse physicochemical effects:
See section 9 for physical and chemical properties.
The vapors are heavier than air and can accumulate in high concentrations on the ground, in cavities, channels and cellars.
The accumulation in lowlying or closed rooms can cause increased danger of fire and explosion.
Vapors can travel considerable distances to a source of ignition where they can ignite, flash back, or explode.
Vapors of flammable solvents can accumulate in the gas phase of closed container, especially during heat treatment.
Therefore keep away from fire and sources of ignition.
This material can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe).
This material can accumulate static charge by flow or agitation and can be ignited by static discharge.
The product will be applied by spraying.
In use, may form flammable/explosive vapor-air mixture.
Until complete evaporation of flammable components explosive vapor-air mixtures may form, even after use.

Adverse human health effects and symptoms:
See section 11 for toxicological information.
Inhalation of aerosol mists can cause damage to health.

Adverse environmental effects:
See section 12 for environmental information.

Other adverse effects:
Special danger of slipping by leaking/spilling product.

Results of PBT-/vPvB-assesment:
See under section 12.5 - Results of PBT and vPvB assessment.

3. Composition/information on ingredients

Mixtures

Chemical characterization

Solution of silicones in a mixture of solvents

Hazardous components

CAS No	Components	Quantity
64742-49-0	hydrocarbons, C7, n-alkanes, isoalkanes, cyclics	84 %

4. First-aid measures

Description of first aid measures

General information

Remove affected person from the danger area and lay down.
Take off immediately all contaminated clothing and wash it before reuse.
Put victim at rest, cover with a blanket and keep warm.
Do not leave affected person unattended.
If a person vomits when lying on his back, place him in the recovery position.
If breathing is irregular or stopped, administer artificial respiration.
If unconscious but breathing normally, place in recovery position and seek medical advice.
Never give anything by mouth to an unconscious person or a person with cramps.
In the event of cardiac arrest immediately perform cardiopulmonary resuscitation.
In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

Self-protection of the first aider:
Wear personal protection equipment (refer to section 8).
First Aid.

Notes for the doctor:
Aspiration hazard
Risk of product entering the lungs on vomiting after ingestion.
Aspiration may cause pulmonary oedema and pneumonitis.
Symptoms may develop several hours following exposure; medical observation therefore necessary for at least 48 hours.

After inhalation

Remove victim out of the danger area.
Provide fresh air.
In the case of lung irritation: Primary treatment using corticoide spray, eg. Auxiloson spray, Pulmicort-dosage-spray. (Auxiloson and Pulmicort are registered trademarks.) Call a physician immediately.
Consult a doctor immediately in the case of inhaling spray mist and show him packing or label.

After contact with skin

Wash immediately with:
Water and soap
Rub greasy ointment into the skin.
Do not wash with:
Solvents/Thinner
In case of skin irritation, consult a physician.

After contact with eyes

In case of contact with eyes flush immediately with plenty of flowing water for 10 to 15 minutes holding eyelids apart and consult an ophthalmologist.
Remove contact lenses, if present and easy to do. Continue rinsing.
If present: Initial treatment with Previn. (Previn is a registered trademark).
Protect uninjured eye.

After ingestion

Do NOT induce vomiting.
Give nothing to eat or drink.
Observe risk of aspiration if vomiting occurs.
Never give anything by mouth to an unconscious person or a person with cramps.
Call a physician immediately.

Most important symptoms and effects, both acute and delayed

The following symptoms may occur:
Cough
Dyspnoea
Cyanosis (blue coloration of the blood)

Pulmonary oedema
Pneumonia
Acidosis
Depression of central nervous system
Headache
Nausea
Dizziness
Dizziness
Inebriation
Unconsciousness

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.
In case of ingestion, the stomach should be emptied by gastric lavage under qualified medical supervision.
Regulation of the blood circulation, possible shock treatment.
Where appropriate artificial ventilation.
Subsequent observance for pneumonia and lung oedema.

5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media

Water mist
Extinguishing powder (ABC-powder)
Foam
Carbon dioxide (CO_2)

Fire class (DIN EN 2): B (Fires of liquids or liquid turning substances).

Unsuitable extinguishing media

Full water jet
Water spray jet

Specific hazards arising from the chemical

In principle, fire gasses of organic materials have to be classified as toxic to the respiratory system.
Burning produces heavy smoke.

Hazardous combustion products:
Carbon monoxide
carbon dioxide (CO_2)
Hydrocarbons
Pyrolysis products, toxic

Special protective equipment and precautions for fire-fighters

Usual measures of preventive and averting fire protection.
Co-ordinate fire-fighting measures to the fire surroundings.
Do not inhale explosion and combustion gases.
Move to fresh air in case of accidental inhalation of fumes from overheating or combustion.
Beware of reignition.
Use caution when applying carbon dioxide in confined spaces. Carbon dioxide can displace oxygen.
Move undamaged containers from immediate hazard area if it can be done safely.
Stop and contain spill/release if it can be done safely. If this cannot be done, allow fire to burn under control.
Use water spray/stream to protect personnel and to cool endangered containers.
Collect contaminated fire extinguishing water separately. Do not allow entering drains or surface water.
Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

Protective equipment and precautions for firefighters
Wear a self-contained breathing apparatus and chemical protective clothing.
DIN-/EN-Norms EN 469
Firefighting protective clothing.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

General advice

Avoid contact with skin, eyes and clothes.
Do not breathe vapor or spray.
Remove all sources of ignition.
Prevent further leakage or spillage if safe to do so.

Remove persons to safety.
Be aware that gases can spread at ground level (heavier than air) and pay attention to the wind direction.
Provide adequate ventilation.
Special danger of slipping by leaking/spilling product.

For non-emergency personnel:
Use personal protection equipment.
Walk out of the danger zone and notify trained personnel.
Emergency procedures:
Keep the factory emergency plan and the information chain.

For emergency responders:
Use personal protection equipment.
The personal protective equipment must be adapted to the situation.
Suitable material:
See under section 8.2 - Personal protection equipment (PPE).

Environmental precautions

Do not allow to enter into surface water or drains.
Do not allow to enter into soil/subsoil.
Ensure waste is collected and contained.
Supress gases/vapors/mists with water spray jet.
In case of gas escape or of entry into waterways, soil or drains, inform the responsible authorities.

Methods and material for containment and cleaning up

Other information

For containment:
Repair leaks if without risk.
Move containers from spill area.
Make sure spills can be contained, e.g. in sump pallets or kerbed areas.
Prevent spread over a wide area (e.g. by containment or oil barriers).
Remove from the water surface (e.g. skimming, sucking).
Cover drains.

For cleaning up:
Clean-up methods - large spillage:
Absorb with liquid-binding material (sand, diatomaceous earth, acid- or universal binding agents).
Shovel into suitable container for disposal.
Local authorities should be advised if significant spillages cannot be contained.
Clean-up methods - small spillage:
Clear spills immediately.
Wipe up with absorbent material (eg. cloth, fleece).
Collect in closed and suitable containers for disposal.
Clear contaminated areas thoroughly.
Recommended cleansing agent:
Clean with detergents. Avoid solvent cleaners.
Retain contaminated washing water and dispose it.
Ensure all waste water is collected and treated via a waste water treatment plant.
Ventilate affected area.

Suitable material for taking up:
Sand
Kieselguhr
Universal binder
Absorbing material, organic

Unsuitable material for taking up:
None known

Reference to other sections

Personal protection equipment (PPE): see section 8
Disposal: see section 13

7. Handling and storage

Precautions for safe handling

Advice on safe handling

Measures to prevent aerosol and dust generation:
All work processes must always be designed so that the following is as low as possible:
Inhalation of vapors or spray/mists
Eye contact
Skin contact

Technical ventilation of workplace
Vapors are heavier than air.
Provide room air exhaust at ground level.
During filling, metering and sampling should be used if possible:
Splashproof grounded devices
Devices with local exhaust
Use only in a exhaust booth with integrated air filter.
Use in ventilated spray booths only.
Recirculation of exhaust air is not recommended.
Always close containers tightly after the removal of product.

Advice on protection against fire and explosion

Measures to prevent fire:
The product is: Highly flammable.
The formation of combustible vapors is possible, at temperatures above: -27 °C (Flash point - 15 °C)
Vapors may form explosive mixtures with air.
Spray mist may be flammable at temperatures below the flash point.
Reignition possible over considerable distance.
Vapors are heavier than air, spread along floors and form explosive mixtures with air.
Due to danger of explosion, prevent leakage of vapors into cellars, flues and ditches.
Provide earthing of containers, equipment, pumps and ventilation facilities.
Use explosion-proof machinery, apparatus, ventilation facilities, tools etc.
Use only non-sparking tools.
Take precautionary measures against static discharges.
Flammable vapors can accumulate in steam space of closed systems.
Only use the material in places where open light, fire and other flammable sources can be kept away.
Keep away from sources of heat (e.g. hot surfaces), sparks and open flames.
Usual measures for fire prevention.
Fire-fighting equipment on the basis of class B.
Never use pressure to empty container.
Wear anti-static footwear and clothing

Measures according to German "Explosion rules" required:
Prevention measures regarding formation of explosible atmosphere (restriction and supervision of concentration, inertisation, airtightness, ventilation, warning device, etc.).
Prevention measures regarding ignition of explosible atmosphere (zone graduation, removing of ignition sources, explosion-proof electrical installation, earthing, etc.).
Constructive measures for restriction of effects regarding explosions (resistance to pressure of explosions, discharge of pressure of explosions, suppression of explosions, etc.).

Further information on handling

Environmental precautions:
Shafts and sewers must be protected from entry of the product.
Transfer wash-downs in sealed containers.
Provide for retaining containers, e.g. floor pan without outflow.
For restriction of emission on volatile organic compounds (VOC) the solvent vapours should be supplied to exhaust air purification facilities (filter, gas washer, incineration).

Advices on general occupational hygiene:
Wear personal protection equipment (refer to section 8).
Minimum standard for preventive measures while handling with working materials are specified in the TRGS 500.
General industrial hygiene practice.
Handle in accordance with good industrial hygiene and safety practice.
Working places should be designed to allow cleaning at any time.
Floors, walls and other surfaces in the hazard area must be cleaned regularly.
Clean spray booth and exhaust hood completely with every product change.
When using do not eat, drink, smoke, sniff.
Thorough skin-cleansing after handling the product.
Used working clothes should not be worn outside the work area.

Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels

Suitable floor material:
Floors should be impervious, resistant to liquids and easy to clean.

Protect against:
Heat
Cold

Recommended storage temperature: +10 ... +30 °C

Keep away from:
Food and feedingstuffs

Packaging materials:
Suitable container/equipment material:
Keep/Store only in original container.
Unsuitable container/equipment material:
See under section 8.2 - Hand protection.

Hints on joint storage

Do not store together with:
Storage class:
1 (Explosive hazardous substances)
2 A (Gases (except aerosol dispensers and lighters))
4.1 A (Other potentially explosive hazardous substances)
4.1 B (flammable solids)
4.2 (Pyrophoric or self-heating substances)
4.3 (Hazardous substances that release flammable gases when in contact with water)
5.1 A (Highly oxidising substances)
5.1 C (Ammonium nitrate and preparations containing ammonium nitrate)
5.2 (Organic peroxides and self-reactive substances)
6.1 B (Non-combustible substances of acute toxicity, category 1 and 2 / very toxic substances)
6.2 (Infectious substances)
7 (Radioactive substances)

Further information on storage conditions

Technical measures and storage conditions:
The valid water and zoning ordinances must be observed.
Heating causes rise in pressure with risk of bursting.
Keep away from sources of ignition - No smoking.
Keep in a cool, well-ventilated place.
Keep container tightly closed.
Protect containers against damage.
Ensure adequate ventilation of the storage area.
Store small packages in a suitable, robust cabinet.
Do not store outside.
See also instuctions on the label.

8. Exposure controls/personal protection

Control parameters

Exposure limits

CAS No.	Substance	ppm	mg/m³	f/cc	Category	Origin
142-82-5	Heptane (n-Heptane)	500	2000		TWA (8 h)	PEL
-	Heptane, all isomers	400			TWA (8 h)	ACGIH-2021
		500			STEL (15 min)	ACGIH-2021
142-82-5	n-Heptane	85	350		TWA (8 h)	REL
		C 440	C 1800		Ceiling	REL
110-54-3	n-Hexane	500	1800		TWA (8 h)	PEL
		50	180		TWA (8 h)	REL
		50			TWA (8 h)	ACGIH-2021

Biological Exposure Indices (BEI-ACGIH)

CAS No.	Substance	Determinant	Value	Test material	Sampling time
110-54-3	n-HEXANE	2,5-Hexanedion (without hydrolysis)	0.5 mg/L	urine	End of shift

Additional advice on limit values

Country information (EU)
(http://www.dguv.de/ifa/fachinfos/occupational-exposure-limit-values/foreign-and-eu-limit-values/index.jsp)
Country information (USA) (https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9992&p_text_version=FALSE)
National Institute for Occupational Safety and Health - NIOSH (http://cdc.gov/niosh/pel88/pelstart.html) / Occupational Safety and Health Administration - Department of Labour (http://osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=SATNDARSp_toc_level=0)
Source of law:

Recommended monitoring procedures:
Workplace atmospheres - Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents (BS EN 14042):
Personal air monitoring
Room air monitoring
Test tube
Gas warning system
Biological monitoring

Preliminary concentration measurements:
Suitable detector tubes for measuring the current concentration in the air at the workplace: DRÄGER test tubes - short-term tubes (http://www.gasmesstechnik.de)
DRÄGER test tubes - Short-term tubes - Petroleum hydrocarbons 10/a (n-octane, measuring range: 10 - 300 ppm, response time: 60 sec) (http://www.gasmesstechnik.de)
DRÄGER test tubes - Short-term tubes - Petroleum hydrocarbons 100/a (n-octane, measuring range: 100 - 2500 ppm, response time: 30 sec) (http://www.gasmesstechnik.de)

Preventive industrial medical examinations are to be offered.
See under section 15.1 - National regulations.

Exposure limits at intended use:

DNEL-/PNEC-values:

Risk management measures according to used control banding approach:
Control banding for chemicals according to the ILO CHEMICAL CONTROL TOOLKIT (ICCT): ICCT-Guidelines and Control Guidance Sheets (http://www.ilo.org/legacy/english/protection/safework/ctrl_banding/toolkit/main_guide.pdf)

Used model:
Consider appropriate model solutions according to good engineering practices while designing the work process if available.

Exposure controls

Appropriate engineering controls

Substance/mixture related measures to prevent exposure during identified uses:
Technical measures to prevent exposure:
Design of appropriate work processes and engineering controls and the use of adequate materials (closed systems with gas-displacement, physical cut-off of man and machine, model solutions as certified working methods, working appliance according to the state of the art, optimisation of process / spray robots, working appliance for prevention of skin contact, models of working times).

Organisational measures to prevent exposure:
Execution of collective protection measures at source and appropriate organisational measures (local exhaust ventilation, ventilation by technical means, general ventilation, measures on averting a danger at breakdowns / at emergencies / after accidents, first aid measures, manner related measures: operating instruction / instruction of employees, occupational medicine health precaution).

Structural measures to prevent exposure:
Execution of individual and personnel protection measures (personal protective equipment - PPE).

If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn. Technical measures and the application of suitable work processes have priority over personal protection equipment.

References for design of technical equipment:
See under section 7.1 - Precautions for safe handling.

Summary of the risk management measures for exposure scenario:
Use only the following product amount per time unit:
No information available.
Minimum room-width and room-height for handling/application:
No information available.
Minimum room ventilation rate for handling/application (air changes per hour):
No information available.

Individual protection measures, such as personal protective equipment

Eye/face protection

If required according to hazard assessment:
Suitable eye protection:
Eye glasses with side protection (EN 166)
Recommended eye protection articles:
UVEX I-VO / UVEX I-3 / UVEX SUPER OTG
Or comparable articles from other companies.

Hand protection

Skin protection:
Preventive skin protection.:
Draw up skin protection programme.
Before starting work, apply solvent-resistant skincare preparations.
e.g. sansibal® / sansibon®, dualin® (PETER GREVEN PHYSIODERM)
Wash hands before breaks and after work.
e.g. ecosan®, topscrub® soft / topscrub® extra / topscrub® nature (PETER GREVEN PHYSIODERM)
After cleaning apply high-fat content skin care cream.
e.g. physioderm® creme, cura soft® / cUrea soft (PETER GREVEN PHYSIODERM)
Apply skin care products after work.

If required according to hazard assessment:
When handling with chemical substances, protective gloves should be worn.
The quality of the protective gloves resistant to chemicals must be chosen as a function of the specific working place concentration and quantity of hazardous substances.
Decrease wearing protection gloves to an inevitable degree to avoid skin rash.
Technical and organizational protective actions have to be preferred.
Breakthrough times and swelling properties of the material must be taken into consideration.
Check leak tightness/impermeability prior to use.
Wear cotton undermitten if possible.
Change preventive gloves once by hour or use special skin-protective preparations for protective gloves carrier,
e.g. physioderm® proGlove (PETER GREVEN PHYSIODERM)
Take recovery periods for skin regeneration.
Do not wear gloves near rotary machines and tools.
Dispose preventive gloves after defect or expiry of wearing time. Replace when worn.
In the case of wanting to use the gloves again, clean them before taking off and air them well.

Wearing time with permanent contact:
Suitable gloves type
Gloves with long cuffs
Recommended glove articles:
Suitable materials at long term, direct contact (Recommended: Preventive index 6, accordingly > 480 min. permeation

time):
Nitrile rubber / NBR (KCL-CAMATRIL VELOURS® - Art. No. 730) - Layer thickness: 0,4 mm
Fluorine rubber / FKM / Viton (KCL-VITOJECT® - Art. No. 890) - Layer thickness: 0,7 mm
Or comparable articles from other companies.

Unsuitable material:
Butyl caoutchouc (butyl rubber)
NR (natural rubber, natural latex)

Wearing time with occasional contact (splashes):
Suitable gloves type
Disposable gloves
Recommended glove articles:
Suitable materials at short term contact or splash (Recommended: Preventive index 3, accordingly > 60 min. permeation time):
Disposable gloves of special nitrile rubber / NBR (KCL-DERMATRIL® P - Art. No. 743) - Layer thickness: 0,2 mm
Or comparable articles from other companies.

The statements are based on self-tests, literary reference and information of glove manufacturers or have been derived from similar substances by analogy.
Source: CHEMIKALIEN-MANAGER - KCL-software for hand protection.
It has to be noticed, that daily time of use of chemical protective gloves may be quite shorter in practice because of many factors of influence (e.g. thermal and mechanical stress as well as special conditions on the floor) than the permeation time determined in accordance to EN 374.
The respective permeation time doubles/halvens at about 1,5 times larger/lower layer thickness.
Declared permeation times are not carried out under practical conditions. Therefore a maximum wearing time up to 50 % of breakthrough time is recommended.
They relate to the pure solvent as mean component.

Barrier creams are not substitutes for body protection.

Skin protection

Suitable protective clothing:
Overall, Natural fibres (e.g. cotton) (EN 340)
For the protection against direct skin contact, body protective clothing is essential (in addition to the usual working clothes).
When handling with chemical substances, protective clothing should be worn.
DIN-/EN-Norms DIN EN 468
Chemical protection clothing (Disposable suit antistatic)
type 6 limited splash-tight
type 5 particle-tight (method B)
type 4 spray-tight
Recommended protective clothing articles:
TYVEK CLASSIC PLUS (DU PONT)
Or comparable articles from other companies.

Chemical resistant safety shoes with conductible sole (EN ISO 20345)

Wash contaminated clothing prior to re-use.
Used working clothes should not be worn outside the work area.
Street clothing should be stored separately from work clothing.

Thermal hazards:
No thermal hazards during use of this product.

Respiratory protection

If required according to hazard assessment:
Respiratory protection necessary at:
aerosol or mist formation + exceeding exposure limit values +
high concentrations / prolonged exposure / insufficient ventilation / insufficient exhaust
Use only respiratory protection equipment with CE-symbol including four digit test number.
Filter types: A, B, E, K. Class 1: Maximum permitted contaminant concentration in inhaled air = 1000 mL/m3 (0.1 % by vol.); class 2: maximum permitted contaminant concentration in inhaled air = 5000 mL/m³ (0.5 % by vol.); class 3: maximum permitted contaminant concentration in inhaled air = 10000 mL/m³ (1.0 % by vol.)
The filter class must be suitable for the maximum contaminant concentration (gas/vapor/aerosol/particulates) that may

arise when handling the product. If the concentration is exceeded, self-contained breathing apparatus must be used. Observe the wear time limits according GefStoffV in combination with the rules for using respiratory protection apparatus (BGR 190).
The use of filter equipment requires a minimum oxygen content of 17 Vol-% in the surrounding atmosphere and that the maximum permitted gas concentration - normally 0,5 Vol-% - is not exceeded.

Suitable respiratory protection apparatus:
Half-face mask or quarter facepiece: maximum use concentration for substances with exposure limits: P1 filter: up to a max. of 4 times the exposure limit. P2 filter: up to a max. of 10 times the exposure limit. P3 filter: up to a max. of 30 times the expo.

Recommended respiratory protection articles:
Half mask or quarter mask with combination filter A1P1/A2P2 for gases, vapors and particles. (EN 140, EN 14387)
Filtering half mask or quarter mask with combination filter FFA1 P1/FFA2P2 for gases, vapors and particles. (EN 405)
Gas filtrating Half-face mask FFA (EN 405)
Model 4251 (FFA1P1 - 1000 ml/m3) / 4255 (FFA2P2SL - 5000 ml/m3) (3M)
Half-face mask or Quarter-face mask with gas filter (EN 140, EN 14387)
Filter type 6051 (A1 - 1000 ml/m3) / 6055 (A2 - 5000 ml/m3) (3M)
Full-face mask with gas filter (EN 136, EN 14387)
Gas filter type: A, Indication colour: brown
Or comparable articles from other companies.

Environmental exposure controls

Environmental exposure controls:
Technical measures to prevent exposure:
Discharge exhaust air only with suitable seperators to atmosphere.
Organisational measures to prevent exposure:
Should not be released into the environment.
Structural measures to prevent exposure:

Use the following recovery and/or abatement technique for cleaning waste gases:
Exhaust air scrubber
Adsorption
Incineration

Further information see under section 6.2 - Environmental precautions.

9. Physical and chemical properties

Information on basic physical and chemical properties

Physical state:	liquid
Color:	colorless
Odor:	characteristic

		Test method
Changes in the physical state		
Melting point/freezing point:	not determined	
Boiling point or initial boiling point and boiling range:	> 90 °C	literature value
Sublimation point:	not applicable	
Softening point:	not applicable	
Pour point:	not applicable	
Flash point:	-12 °C	EN ISO 13736
Flammability		
Solid/liquid:	not applicable (Liquid)	
Gas:	not applicable (Liquid)	

Explosive properties

In use, may form flammable/explosive vapor-air mixture.
The statements for steam pressure, ignition point and explosion levels apply to the solvent / solvent mixture.

Lower explosion limits:	0,6 vol. %	literature value
Upper explosion limits:	8,0 vol. %	literature value
Auto-ignition temperature:	> 200 °C	literature value

Self-ignition temperature

Solid:	Not pyrophoric.	
Gas:	Not pyrophoric.	
Decomposition temperature:	not determined	

Oxidizing properties

not relevant

pH-Value:	not applicable	
Viscosity / dynamic:	not determined	
Viscosity / kinematic: (at 40 °C)	2,0 mm²/s	DIN 53015
Flow time: (at 23 °C)	25 s	3 DIN EN ISO 2431
Water solubility: (at 20 °C)	practically insoluble: < 0,1 g/L	literature value

Solubility in other solvents

miscible with most organic solvents

Partition coefficient n-octanol/water:	not applicable (Mixtures)	
Vapor pressure: (at 20 °C)	< 70 hPa	literature value
Vapor pressure: (at 50 °C)	< 235 hPa	literature value
Density (at 20 °C):	(6,175 lbs/gal) 0,74 g/cm³	DIN 51757
Bulk density:	not applicable (Liquid)	
Relative vapour density: (at 25 °C)	~ 3.2 (Air=1)	literature value

Other information

Other safety characteristics

Solvent separation test:	not applicable	
Solvent content:	not determined	
Solid content:	not determined	
Evaporation rate: (at 20 °C)	< 3.9 (n-Butyl acetate=1)	ASTM D 3539

Further Information

Temperature Class (DIN EN 60079-0): T 3 (T > +200 °C ... <= +300 °C)
Limiting oxygen concentration (LOC) (DIN EN 14756): No data available
Explosion group: IIA
Maximum experimental safe gap (MESG) (IEC 60079-1-1): > 0,9 mm
Minimum ignition current (MIC) (IEC 60079-11): No data available
Minimum ignition energy (MIE) (DIN EN 13673-1): No data available
Odor threshold: 900 ppm ((heptane; n-heptane), literature value)
Molecular weight: ~ 100 g/mol (calculated)

Data apply to the main component.

Conductivity (ASTM D 2624): > 1000 pS/m
Surface tension: No data available
Fat solubility: No data available
Calculated oxidation potential of the mixture (OP): not relevant

Substance group relevant properties:
Data relevant with regard to physical hazard classes (supplemental):
Explosives
not applicable
Flammable gases
Non-flammable. / not applicable (Liquid)
Aerosols
Non-flammable. / not applicable (Liquid)
Oxidising gas
Not oxidising. / not applicable (Liquid)
Gases under pressure
not applicable (Liquid)

Flammable liquids
Highly flammable
In use, may form flammable/explosive vapor-air mixture.
flammable solids
Non-flammable. / not applicable (Liquid)
Self-reactive substances and mixtures
not applicable
Pyrophoric liquids
Not pyrophoric.
Pyrophoric solids
Not pyrophoric. / not applicable (Liquid)
self-heating substances and mixtures
not applicable
Substances or mixtures which, in contact with water, emit flammable gases
not applicable
Oxidising liquids
Not oxidising.
Oxidising solids
Not oxidising. / not applicable (Liquid)
Organic peroxides
not applicable
Corrosive to metals.
Not corrosive to metals.

10. Stability and reactivity

Reactivity

The product is chemically stable under recommended conditions of storage, use and temperature.

Chemical stability

Stability: Stable

The product is chemically stable under recommended conditions of storage, use and temperature.

Possibility of hazardous reactions

Hazardous reactions: Will not occur

No hazardous reaction when handled and stored according to provisions.

Conditions to avoid

Heat, flames and sparks.
Further information see under section 7.2 - Conditions for safe storage, including any incompatibilities.
Further information see under section 10.5 - Incompatible materials.

Incompatible materials

Violent reaction with:
strong
Further information see under section 7.1 - Precautions for safe handling.

Hazardous decomposition products

Does not decompose when used for intended uses.
No known hazardous decomposition products.
Under fire conditions: See under section 5.2 - Specific hazards arising from the chemical.

11. Toxicological information

Information on toxicological effects

Route(s) of Entry

Inhalation: X
Skin: X
Ingestion: X

Toxicocinetics, metabolism and distribution

There are no data available on the preparation/mixture itself.
The product has not been tested.

Information on likely routes of exposure /
Symptoms related to the physical, chemical and toxicological characteristics:
See under section 4.2 - Most important symptoms/effects, acute and delayed.

Exposure route:
In case of ingestion:
Ingestion causes nausea, weakness and central nervous system effects.

Aspiration hazard
The risk of aspiration (penetration of liquids through the oral or nasal cavity into the trachea and lower respiratory system) is restricted solely to accidental ingestion (accident involvement) and not to the inhalation of fine mist (aerosols), as this does not result in juxtaposition of the particles, which could trigger a chemical pneumonia in the lungs.
According to the "qualitative exposure assessment" for as Asp. Tox 1, H304 classified substances and mixtures (without DNEL's) the risk management measures restricting the use of the safety P301+P310 and P331 in the SDS and on the label.

In case of skin contact:
irritant.
erythema (redness)
Prolonged or repeated skin contact may cause removal of natural fat from the skin resulting in dermatitis (skin inflammation).

In case of inhalation:
slightly irritant but not relevant for classification.
Narcotic effects
In animal experiments aerosol mists (from organic solutions / dispersions or aquatic emulsions) based on polymeric components of the mixture can cause damage to health if inhaled.

In case of eye contact:
slightly irritant but not relevant for classification.
Conjunctival redness.

Delayed and immediate effects as well as chronic effects from short and long-term exposure:
Inhalative specific target organ toxicity (single exposure)

Interactive effects:
Not relevant

Absence of specific data:
No data is available on the product itself. Description of possible hazardous to health effects is based on experience and/or toxicological characteristics of several components.
However, some datas are not complete regarding particular main components. Nevertheless according to the experience of the manufacturer there are no other hazards expected then those which are already mentioned on the label.

Mixture versus substance information:
Not relevant

Acute toxicity

Based on available data, the classification criteria are not met.

CAS No	Components				
	Exposure route	Dose	Species	Source	Method
64742-49-0	hydrocarbons, C7, n-alkanes, isoalkanes, cyclics				
	oral	LD50 > 5840 mg/kg	Rat	Supplier / ECHA	
	dermal	LD50 > 2800 mg/kg	Rat	Supplier / ECHA	
	inhalation (4 h) vapour	LC50 > 23,3 mg/l	Rat	Supplier / ECHA	OECD 403

Irritation and corrosivity

Causes skin irritation
Serious eye damage/eye irritation: Based on available data, the classification criteria are not met.

Sensitizing effects

Based on available data, the classification criteria are not met.

Carcinogenic/mutagenic/toxic effects for reproduction

Based on available data, the classification criteria are not met.

Specific target organ toxicity (STOT) - single exposure

May cause drowsiness or dizziness (hydrocarbons, C7, n-alkanes, isoalkanes, cyclics)

Specific target organ toxicity (STOT) - repeated exposure

Based on available data, the classification criteria are not met.

Aspiration hazard

May be fatal if swallowed and enters airways

12. Ecological information

Ecotoxicity

Aquatic toxicity:
Acute (short-term) fish toxicity:
There are no data available on the preparation/mixture itself. The product has not been tested.
Acute (short-term) toxicity to crustacea:
There are no data available on the preparation/mixture itself. The product has not been tested.
Acute (short-term) toxicity to algae and cyanobacteria:
There are no data available on the preparation/mixture itself. The product has not been tested.

Chronic (long-term) toxicity to aquatic invertebrate:
There are no data available on the preparation/mixture itself. The product has not been tested.
Chronic (long-term) fish toxicity:
There are no data available on the preparation/mixture itself. The product has not been tested.

Toxicity to other aquatic plants/organisms:
No data available (Substances/Ingredient)

Terrestrial toxicity:
Acute and subchronic bird toxicity:
No data available (Substances/Ingredient)
Bird reproduction toxicity:
No data available (Substances/Ingredient)
Acute earthworm toxicity:
No data available (Substances/Ingredient)
Chronical earthworm toxicity (reproduction):
No data available (Substances/Ingredient)
Useful insect toxicity:
No data available (Substances/Ingredient)
Acute plant toxicity:
No data available (Substances/Ingredient)
Chronic plant toxicity:
No data available (Substances/Ingredient)
Toxicity to soil macroorganisms except of arthropods:
No data available (Substances/Ingredient)
Effects on soil microorganisms:
No data available (Substances/Ingredient)

Behaviour in waste water treatment plants:
Due to its low solubility in water the product is almost completely mechanically separated in biological sewage plants.
Observe local regulations concerning effluent treatment.

CAS No	Components						
	Aquatic toxicity	Dose		[h] | [d]	Species	Source	Method
64742-49-0	hydrocarbons, C7, n-alkanes, isoalkanes, cyclics						
	Acute fish toxicity	LL50 mg/l	> 13,4	96 h	Oncorhynchus mykiss	Supplier / ECHA	OECD 203
	Acute algae toxicity	ErC50 mg/l	10-30	72 h	Pseudokirchneriella subcapitata	Supplier / ECHA	OECD 201
	Acute crustacea toxicity	EL50	3 mg/l	48 h	Daphnia magna	Supplier / ECHA	OECD 202
	Fish toxicity	NOEC mg/l	1,534	28 d	Oncorhynchus mykiss	Supplier / ECHA	[growth rate]
	Algae toxicity	NOEC	6,3 mg/l	4 d	Pseudokirchneriella subcapitata	Supplier / ECHA	OECD 201
	Crustacea toxicity	NOEC	0,17 mg/l	21 d	Daphnia magna	Supplier / ECHA	OECD 211
	Acute bacteria toxicity	(26,81 mg/l)		0 h	Tetrahymena pyriformis	ECHA	[48h] [growth]

Persistence and degradability

Abiotic degradation:
Physicochemical elimination:
Oxidation:
not applicable (Mixtures)

In air a rapid reduction is expected.
The information about ecology refers to the main components.

Hydrolysis:
not applicable (Mixtures)
It is not expected to conversion due to hydrolysis to any significant extent.
The information about ecology refers to the main components.

Photochemical elimination:
Photolysis:
not applicable (Mixtures)
It is not expected to conversion due to photolysis to any significant extent.
The information about ecology refers to the main components.

Ozonolysis:
not applicable (Mixtures)

Biodegradation:
not applicable (Mixtures)

Bioaccumulative potential

not applicable (Mixtures)

Mobility in soil

Surface tension:
See under section 9.1 - Information on basic physical and chemical properties.

Distribution:
Water-air (volatility rate, Henry-constant):
not applicable (Mixtures)
The product is insoluble and floats on water.
Product is easily volatile.
The information about ecology refers to the main components.

Soil-Water (Adsorption coefficient):
not applicable (Mixtures)
If product enters soil, it will be mobile and may contaminate groundwater.
The information about ecology refers to the main components.

Soil-Air (volatility rate):
not applicable (Mixtures)
Product is easily volatile.
The information about ecology refers to the main components.

This product contains one or more hydrocarbon UVCB's. Standard tests for this endpoint are intended for single substances and are not appropriate for this complex substance.

Other adverse effects

Ozone depletion potential (ODP):
No data available (Substances/Ingredient)

Photochemical ozone creation potential (POCP):
No data available (Substances/Ingredient)

Global warming potential (GWP):
No data available (Substances/Ingredient)

Endocrine disrupting potential
No data available

AOX: Product does not contain any organic halogens.

13. Disposal considerations

Waste treatment methods

Disposal recommendations

Waste treatment options:
Send to a hazardous waste incinerator facility under observation of official regulations.

Dispose of waste according to applicable legislation.
Waste disposal according to directive 2008/98/EC, covering waste and dangerous waste.
Properties of waste which render it hazardous:
Highly flammable
Irritant — skin irritation and eye damage
Specific Target Organ Toxicity (STOT)/Aspiration Toxicity

Evidence for disposal must be provided.
Consult the appropriate local waste disposal expert about waste disposal.
Waste for recycling is to be classified and labelled.
For recycling, contact recycling exchanges.
May not be disposed or deposited together with domestic garbage.
Do not mix with other wastes.
Do not flush into surface water or sanitary sewer system.
Do not dispose of waste into sewer.
Before discharge in public drains (e.g. residues of washing- and rinsing liquids) please observe the relevant regulations. In case of further questions please contact your waste- or environmental representative or the responsible authority.
Clean IBCs or drums at approved facility only.
The waste producer is resposible for correct coding and designation of his wastes.
The allocation of waste identity numbers/waste descriptions must be carried out according to the EEC, specific to the industry and process.
List of proposed waste codes/waste designations in accordance with EWC:

RCRA Hazardous wastes (Resource Conservation and Recovery Act)

D001 Ignitability

Contaminated packaging

Other disposal recommendations:
Contaminated packages must be completely emptied and can be re-used following proper cleaning.
Cleaning by recycling company.
Recommended cleansing agent:
Clean with detergents. Avoid solvent cleaners.

Handle contaminated packages in the same way as the substance itself.
Non-contaminated packages may be recycled.
Packing which cannot be properly cleaned must be disposed of.
As well uncleaned (empty) containers remain contaminated by product residues and may be hazardous by vapours. They have to be disposed by specialists or have to be supplied to a licensed reconditioning.
The conditions of the regional reconditioning companies have to be observed.

14. Transport information

US DOT 49 CFR 172.101

UN number or ID number:	UN1268
Proper shipping name:	PETROLEUM PRODUCTS, N.O.S.
Transport hazard class(es):	3
Packing group:	II
Hazard label:	3

Marine transport (IMDG)

UN number or ID number:	UN1268
UN proper shipping name:	PETROLEUM PRODUCTS, N.O.S. (Naphtha (Petroleum), hydrotreated, light)
Transport hazard class(es):	3
Packing group:	II
Hazard label:	3

Marine pollutant:	P
Special Provisions:	-
Limited quantity:	1 L
Excepted quantity:	E2
EmS:	F-E, S-E
Segregation group:	IMDG-Code segregation group not applicable

Other applicable information (marine transport)

Exception(s): Not applicable

Air transport (ICAO-TI/IATA-DGR)

UN number or ID number:	UN1268
UN proper shipping name:	PETROLEUM PRODUCTS, N.O.S.
Transport hazard class(es):	3
Packing group:	II
Hazard label:	3

Special Provisions:	A3
Limited quantity Passenger:	1 L
Passenger LQ:	Y341
Excepted quantity:	E2
IATA-packing instructions - Passenger:	353
IATA-max. quantity - Passenger:	5 L
IATA-packing instructions - Cargo:	364
IATA-max. quantity - Cargo:	60 L

Other applicable information (air transport)

ERG Kodex: 3H

The state variations in chapter 2.8.1 and the operator variations in chapter 2.8.3 for shipping of dangerous goods in limited quantities according to chapter 2.7 of the valid ICAO/IATA Dangerous Goods Regulations have to be observed.

The rulings for dangerous goods by air mail according to chapter 2.4 of the valid ICAO/IATA Dangerous Goods Regulations and the conventions of the Universal Postal Union (UPU) as well as the clauses of the relevant National Postal Administation have to be observed. Airmail: prohibited.

Environmental hazards

ENVIRONMENTALLY HAZARDOUS: Yes

Danger releasing substance: Naphtha (Petroleum), hydrotreated, light

Special precautions for user

Further information see under section 6, 7, 8.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

No bulk transport in accordance with IBC code.
It is sold exclusively in traffic legally authorized and appropriate packaging.

Other applicable information

Postal, express and courier services:
Postal service (national):
Refer to your National Postal Administation.
Express freight / special delivery:
Refer to your National Postal Administation.
Courier service (national):
The general conditions of business of the particular courier service have to be observed.

15. Regulatory information

U.S. Regulations

National Inventory TSCA

All intentional used ingrendients of this product are listed in the TSCA-inventory or correspond to TSCA-exceptions on polymers according to 40 CFR 723.

National regulatory information

SARA Section 304 CERCLA:
n-Hexane (110-54-3): Reportable quantity = 5,000 (2270) lbs. (kg)
SARA Section 311/312 Hazards:
hydrocarbons, C7, n-alkanes, isoalkanes, cyclics (64742-49-0): Fire hazard, Immediate (acute) health hazard
SARA Section 313 Toxic release inventory:
n-Hexane (110-54-3): De minimis limit = 1.0 %, Reportable threshold = Standard
Clean Air Act Section 112(b):

n-Hexane (110-54-3)

State Regulations

Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65, State of California)

This product can not expose you to chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Additional information

Other regulations, restrictions and prohibition regulations:

International chemical inventories (Registration status on substances): No data available

Other regulations, restrictions and prohibition regulations:

International chemical inventories (Registration status on substances): No data available

16. Other information

Hazardous Materials Information Label (HMIS)

Health:	1
Flammability:	3
Physical Hazard:	0
Personal Protection:	I

NFPA Hazard Ratings

Health:	1
Flammability:	3
Reactivity:	0
Unique Hazard:	---

Changes

Revision date:	03/26/2019
Revision No:	1,30

This version replaces all former issues.

Changes made in this revision see section: 2, 16.

Abbreviations and acronyms

ATE: Acute Toxicity Estimate.
CAS: Chemical Abstracts Service.
CLP: Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008.
C&L: Classification & Labeling.
DNEL: Derived No-Effect Level.
EC50: Effective concentration, 50 percent.
ECHA: European Chemicals Agency.
EINECS: European Inventory of Existing Commercial Chemical Substances.
ELINCS: European List of Notified Chemical Substances.
GHS: Globally Harmonized System of Classification and Labelling of Chemicals.
HSPA: Hydrocarbon Solvents Producers Association.
IATA: International Air Transport Association.
IBC-Code: International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (International Bulk Chemical Code).

IC50 / ErC50: Inhibitory concentration, 50 percent.
ICAO-TI: International Civil Aviation Organization Technical Instruction.
IMDG-Code: International Maritime Dangerous Goods Code.
ISO: A standard of International Standards Organisation.
IUPAC: International Union for Pure and Applied Chemistry.
LC50: Lethal concentration, 50 percent.
LD50: Lethal Dose, 50 percent.
log Kow (Pow): octanol-water partition coefficient.
LQ: Limited Quantities.
MARPOL: Maritime Polluntion Convention (Convention for the Prevention of Pollution from Ships).
OC: Operational Conditions.
OECD: Organisation for Economic Co-operation and Development.
OSHA: Occupational Safety and Health Agency.
PBT: Persistent, bioaccumulabe and toxic.
PEC: Predicted Effect Concentration.
PNEC: Predicted No-Effect Concentration.
PPE: Personal Protection Equipment.
(Q)SAR: Quantitative-Structure-Activity-Relationship.
RMM: Risk Management Measure.
STOT - RE: Specific Target Organ Toxicity - Repeated Exposure.
STOT - SE: Specific Target Organ Toxicity - Single Exposure.
UN: United Nations.
UVCB: Substances of Unknown or Variable composition, Complex reaction products or Biological materials.
vPvB: Very persistent and very bioaccumulable.
WoE: Weight of Evidence.

For abbreviations and acronyms, see table at http://abbrev.esdscom.eu

Other data

Key literature references and sources for data:
The classification corresponds to current EC-lists, but is completed by statements of technical literature and company data.

Other public accessible sources:
Hazard Communication Standard (HCS 2012) according to 29 CFR 1910.1200 in the valid version in each case (https://www.ecfr.gov/)

Further information and practical guides on the internet:
eChemPortal (http://www.echemportal.org)
Environmental Protection Agency - EPA (http://www.epa.gov) / ECOTOX-Database (http://cfpub.epa.gov/ecotox)

Recommended restriction of application:
See under section 1.2 - Uses advised against.
Use this product only for intended purpose in accordance with our product informations.
Please refer to our internet website for more information (http://www.acmos.com).

Training advice:
Yearly briefing and instruction of employees by means of of operation instructions according to article 8 of EC-directive 98/24/EC.

Inquiry office: Laboratory (Division: Occupational- /Product security)
Contact person: Mr. Dryhaus (Telephone: 01149-421-5189-0, Telefax: 01149-421-5189-871)
Office hours: Mo - Th from 7.30 - 16.15 h and Fr from 7.30 - 13.30 h. Out of office hours no call diversion.

Disclaimer:
The information is based on the present level of our knowledge. It does not, however, give assurance of product properties and establishes no contract legal rights. The information contained herein are, to our knowledge at the time of their creation to be correct and been taken from sources deemed to be reliable. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release The receiver of our product is singularly responsible for adhering to existing laws and regulations. All descriptions are approximate values, they are not specified for construction of specifications. This safety data sheet does not represent any operating instruction according to national chemical regulations. It may be used for creation, but must not replace it. The employer is not relieved from his duties. All technical information to occupational protection are directed predominately to experts first (safety engineers, occupational medicines).

Craig Schmeisser

From: Butler, Eddie, FW-NA <Eddie.Butler@fritzwinter.us>
Sent: Tuesday, January 4, 2022 8:01 AM
To: Craig Schmeisser
Cc: McCarty, Joseph, FW-NA
Subject: FW: Acmos 118-63 SDS and VOC content
Attachments: ACMOS 118-63USA-en-PN118-63.US.pdf

Info so far…

Eddie G Butler
EHS Manager
1 Fritz Winter Drive
Franklin, Kentucky 42134
Eddie.Butler@fritzwinter.us
Ofc: 270-813-4000 Ext 172

Best regards / Mit freundlichen Grüßen / Meilleures salutations

Eddie Butler
EHS Manager

Fritz Winter North America LP
1 Fritz Winter Drive
Franklin KY 42134
Vereinigte Staaten

Telephone number +1 270-813-4000 ext. 172
Mail: Eddie.Butler@fritzwinter.us
http://www.fritzwinter.com

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From: Info Acmos <info@acmosinc.com>
Sent: Monday, January 3, 2022 7:17 AM
To: Butler, Eddie, FW-NA <Eddie.Butler@fritzwinter.us>
Subject: Acmos 118-63 SDS and VOC content

Morning Eddie,

I am following up on your request. The latest MSDS is to be found in the attachment. VOC content is 84 % (622 g/l).

If you have any additional questions, please let us know.

Thank you!

Alyssa

Sincerely,

Alyssa Boehringer
Office Manager
724-220-6644 **Office**
724-713-8934 **Mobile**
alyssa@acmosinc.com

ACMOS INC.
5000 Stonewood Drive, Suite 200
Wexford PA 15090
www.acmos.com

SAFETY DATA SHEET

1. Identification

Product identifier **NixStix CB/NB FastDry**

Other means of identification

SDS number 300000011623

Material Number 362305

Recommended use Release Agent for Foundry Patterns and Dies

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name HA International, LLC

Address 630 Oakmont Lane
Westmont, IL 60559
United States

Telephone

General Assistance	(630) 575-5700
EH&S	(630) 575-5705
Regulatory Affairs	(630) 575-5722
Customer Service	(800)323-6863

Website www.ha-international.com

E-mail msdsquestions@ha-international.com

Contact person Jacqueline Ramirez 630-575-5722, Jeff Krause 630-575-5705

Emergency phone number

Medical Emergency	(303)-389-1396
Toll Free	(866)595-5738

2. Hazard(s) identification

Physical hazards	Flammable liquids	Category 2
Health hazards	Serious eye damage/eye irritation	Category 2A
	Germ cell mutagenicity	Category 1B
	Carcinogenicity	Category 1B
	Aspiration hazard	Category 1
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 2
	Hazardous to the aquatic environment, long-term hazard	Category 2
OSHA defined hazards	Not classified.	

Label elements

Signal word Danger

Hazard statement Highly flammable liquid and vapor. May be fatal if swallowed and enters airways. Causes serious eye irritation. May cause genetic defects. May cause cancer. Toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Precautionary statement

Prevention	This is a hazardous chemical product. It is important that all employees working with this product receive initial and periodic refresher training in its safe use and handling, both for basic risk management purposes and for compliance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200. Model training materials are available upon request for many of our products. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wash thoroughly after handling. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.
Response	If swallowed: Immediately call a poison center/doctor. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If exposed or concerned: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. In case of fire: Use appropriate media to extinguish. Collect spillage.
Storage	Store in a well-ventilated place. Keep cool. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	Static accumulating flammable liquid can become electrostatically charged even in bonded and grounded equipment. Sparks may ignite liquid and vapor. May cause flash fire or explosion.
Supplemental information	100% of the mixture consists of component(s) of unknown acute oral toxicity. 100% of the mixture consists of component(s) of unknown acute dermal toxicity. 15% of the mixture consists of component(s) of unknown acute inhalation toxicity. 2.5% of the mixture consists of component(s) of unknown acute hazards to the aquatic environment. 2.5% of the mixture consists of component(s) of unknown long-term hazards to the aquatic environment.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Light Aliphatic Solvent Naphtha (petroleum)		64742-89-8	80 - < 90*
"Siloxanes and Silicones, Di-Me"		63148-62-9	10 - < 20*
Other components below reportable levels			1 - < 3

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Take off immediately all contaminated clothing. Rinse skin with water/shower. Get medical attention if irritation develops and persists.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.
Ingestion	Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Most important symptoms/effects, acute and delayed	Aspiration may cause pulmonary edema and pneumonitis. Dizziness. Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Thermal burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim under observation. Symptoms may be delayed.
General information	Take off all contaminated clothing immediately. IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Carbon dioxide (CO2). Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical	Vapors may form explosive mixtures with air. Vapors may travel considerable distance to a source of ignition and flash back. This product is a poor conductor of electricity and can become electrostatically charged. If sufficient charge is accumulated, ignition of flammable mixtures can occur. To reduce potential for static discharge, use proper bonding and grounding procedures. This liquid may accumulate static electricity when filling properly grounded containers. Static electricity accumulation may be significantly increased by the presence of small quantities of water or other contaminants. Material will float and may ignite on surface of water. During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	Highly flammable liquid and vapor.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Use appropriate containment to avoid environmental contamination. Transfer by mechanical means such as vacuum truck to a salvage tank or other suitable container for recovery or safe disposal. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep combustibles (wood, paper, oil, etc.) away from spilled material. Take precautionary measures against static discharge. Use only non-sparking tools. This product is miscible in water. This material is classified as a water pollutant under the Clean Water Act and should be prevented from contaminating soil or from entering sewage and drainage systems which lead to waterways. Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Following product recovery, flush area with water. Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. Put material in suitable, covered, labeled containers. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground. Use appropriate containment to avoid environmental contamination.

7. Handling and storage

Precautions for safe handling	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. When using do not smoke. Explosion-proof general and local exhaust ventilation. Minimize fire risks from flammable and combustible materials (including combustible dust and static accumulating liquids) or dangerous reactions with incompatible materials. Handling operations that can promote accumulation of static charges include but are not limited to: mixing, filtering, pumping at high flow rates, splash filling, creating mists or sprays, tank and container filling, tank cleaning, sampling, gauging, switch loading, vacuum truck operations. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. Avoid contact with eyes. Avoid prolonged exposure. Should be handled in closed systems, if possible. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices. For additional information on equipment bonding and grounding, refer to the Canadian Electrical Code in Canada, (CSA C22.1), or the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents" or National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity" or National Fire Protection Association (NFPA) 70, "National Electrical Code".

Conditions for safe storage, including any incompatibilities

Store locked up. Keep away from heat, sparks and open flame. Prevent electrostatic charge build-up by using common bonding and grounding techniques. Eliminate sources of ignition. Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity. Store in a cool, dry place out of direct sunlight. Store in original tightly closed container. Store in a well-ventilated place. Keep in an area equipped with sprinklers. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit. At this time, the other constituents have no known exposure limits.

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Light Aliphatic Solvent Naphtha (petroleum) (CAS 64742-89-8)	PEL	400 mg/m3
		100 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Light Aliphatic Solvent Naphtha (petroleum) (CAS 64742-89-8)	TWA	400 mg/m3
		100 ppm

Biological limit values No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls Explosion-proof general and local exhaust ventilation. Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Provide eyewash station. Eye wash fountain and emergency showers are recommended.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin protection

Hand protection Wear appropriate chemical resistant gloves.

Other Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection Respiratory protection is not normally required for general core room workers when sufficient ventilation is provided to consistently maintain exposures below acceptable exposure criteria. Periodic exposure monitoring should be conducted to ensure exposures remain below relevant criteria. Use respiratory protection consisting of a chemical-specific cartridge respirator or supplied air respirator when performing line breaks, liquid transfers, or other operations where exposure to liquid or elevated vapor concentrations is possible.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Observe any medical surveillance requirements. When using do not smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state Liquid.

Form Liquid

Color Clear, colorless

Odor Solvent

Odor threshold Not available.

pH Not available.

pH concentration Not Available

Melting point/freezing point Not Available

Initial boiling point and boiling range	195.8 - 210.2 °F (91 - 99 °C)
Flash point	> 19.9 °F (> -6.7 °C) Setaflash Closed Cup
Evaporation rate	Not Available
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	1 % (V) (Solvent)
Explosive limit - upper (%)	8 % (V) (Solvent)
Vapor pressure	< 40 mm Hg Approximate (Solvent)
Vapor density	Not Available
Relative density	0.72 - 0.73
Solubility(ies)	
Solubility (water)	Not Available
Partition coefficient (n-octanol/water)	Not Available
Auto-ignition temperature	550 °F (287.78 °C) estimated
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Dynamic viscosity	Not Available
Explosive properties	Not explosive.
Flammability class	Flammable IB estimated
Oxidizing properties	Not oxidizing.
Thermal hazards	
Relative self-ignition temperature	Not Available

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Avoid heat, sparks, open flames and other ignition sources. Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Prolonged inhalation may be harmful.
Skin contact	No adverse effects due to skin contact are expected.
Eye contact	Causes serious eye irritation.
Ingestion	Droplets of the product aspirated into the lungs through ingestion or vomiting may cause a serious chemical pneumonia.
Symptoms related to the physical, chemical and toxicological characteristics	Aspiration may cause pulmonary edema and pneumonitis. Dizziness. Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision.

Information on toxicological effects

Acute toxicity	May be fatal if swallowed and enters airways.
Skin corrosion/irritation	Prolonged skin contact may cause temporary irritation.
Serious eye damage/eye irritation	Causes serious eye irritation.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity May cause genetic defects.

Carcinogenicity May cause cancer.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Not regulated.

US. National Toxicology Program (NTP) Report on Carcinogens

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard May be fatal if swallowed and enters airways.

Chronic effects Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity Toxic to aquatic life with long lasting effects.

Components		Species	Test Results
"Siloxanes and Silicones, Di-Me" (CAS 63148-62-9)			
Aquatic			
Fish	LC50	Channel catfish (Ictalurus punctatus)	2.36 - 4.15 mg/l, 96 hours
Light Aliphatic Solvent Naphtha (petroleum) (CAS 64742-89-8)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia pulex)	2.7 - 5.1 mg/l, 48 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	8.8 mg/l, 96 hours
			8.8 mg/l, 96 hours

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available.

Mobility in soil No data available.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number UN1206

UN proper shipping name Heptanes solution

Transport hazard class(es)

Class	3
Subsidiary risk	-
Packing group	II

Environmental hazards

Marine pollutant	Yes

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Transport hazard class(es)

Label(s)	3

ERG 128

Transport hazard class(es)

Marine pollutant	Light Aliphatic Solvent Naphtha (petroleum)
Marine pollutant	"Siloxanes and Silicones, Di-Me"

TDG

UN number	UN1206
UN proper shipping name	HEPTANES SOLUTION

Transport hazard class(es)

Class	3
Subsidiary risk	-
Packing group	II

Special precautions for users Read safety instructions, SDS and emergency procedures before handling.

Transport Hazard Class(es)

Marine pollutant	Not applicable.
Marine pollutant	Not applicable.

IATA

UN number	UN1206
UN proper shipping name	Heptanes solution

Transport hazard class(es)

Class	3
Subsidiary risk	-
Packing group	II

Environmental hazards

Marine pollutant	No.

ERG Code 3H

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Other information

Passenger and cargo aircraft	Allowed with restrictions.
Cargo aircraft only	Allowed with restrictions.

IMDG

UN number	UN1206
UN proper shipping name	HEPTANES SOLUTION

Transport hazard class(es)

Class	3
Subsidiary risk	-
Packing group	II

Environmental hazards

Marine pollutant	Yes

EmS F-E, S-D

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Transport hazard class(es)

Marine pollutant	Light Aliphatic Solvent Naphtha (petroleum)
Marine pollutant	"Siloxanes and Silicones, Di-Me"

DOT

IATA; IMDG; TDG

General information IMDG Regulated Marine Pollutant. DOT Regulated Marine Pollutant.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

Classified hazard categories
Flammable (gases, aerosols, liquids, or solids)
Serious eye damage or eye irritation
Germ cell mutagenicity
Carcinogenicity
Aspiration hazard
Hazard not otherwise classified (HNOC)

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 2016 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

Light Aliphatic Solvent Naphtha (petroleum) (CAS 64742-89-8)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Toxic Chemical Substances (TCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 01-12-2015

Revision date 09-27-2018

Version # 04

HMIS® ratings Health: 3*
Flammability: 3
Physical hazard: 0

NFPA ratings Health: 2
Flammability: 3
Instability: 0

NFPA ratings

Disclaimer HA International, LLC cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE, except that the product shall conform to contracted specifications, and that the product does not infringe any valid United States or Canadian patent. No claim of any kind shall be greater in amount than the purchase price of the quantity of product in respect of which damages are claimed. In no event shall Seller be liable for incidental or consequential damages, whether Buyer's claim is based on contract, breach of warranty, negligence or otherwise.

Revision information

Hazard(s) identification: Response
Hazard(s) identification: Hazard statement
Hazard(s) identification: Hazard(s) not otherwise classified (HNOC)
First-aid measures: Eye contact
Accidental release measures: Personal precautions, protective equipment and emergency procedures
Accidental release measures: Methods and materials for containment and cleaning up
Handling and storage: Conditions for safe storage, including any incompatibilities
Exposure controls/personal protection: Hand protection
Exposure controls/personal protection: Other
Exposure controls/personal protection: PPE Symbols
Transport Information: Proper Shipping Name/Packing Group
Transport information: General information
Regulatory information: California Proposition 65
Other information, including date of preparation or last revision: References

Craig Schmeisser

From: Krause, Jeffrey <jeff.krause@ha-international.com>
Sent: Monday, January 3, 2022 9:05 AM
To: Craig Schmeisser
Cc: Eddie Butler
Subject: RE: HA NixStix CB/NB Fast Dry - VOC Content

85% by weight, Craig.

Best wishes for a happy new year!

Jeff Krause
Director, EH&S
HA International, LLC
(630) 575-5705 (w)
(773)263-2355 (m)
Jeff.Krause@HA-International.com

From: Craig Schmeisser [mailto:craig.schmeisser@madriverstrategies.com]
Sent: Thursday, December 30, 2021 11:43 AM
To: Krause, Jeffrey <jeff.krause@ha-international.com>
Cc: Eddie Butler <eddie.butler@fritzwinter.us>
Subject: HA NixStix CB/NB Fast Dry - VOC Content

Hi Jeff and Happy Holidays,
Can you provide the expected VOC content of you HA NixStix CB/NB Fast Dry product? Early next week is fine. Thank you.

Craig S. Schmeisser
Mad River Strategies, LLC
craig.schmeisser@madriverstrategies.com
614.425.6392

Safety Data Sheet
KERNTOP WV 031 111 COATING IBC716 FW

SECTION 1. IDENTIFICATION

Product name	:	KERNTOP WV 031 111 COATING IBC716 FW
Material	:	852674

Manufacturer or supplier's details

Company	:	ASK CHEMICALS LLC
Address	:	495 Metro Place South Suite 250 Dublin, OH 43017 United States of America
Emergency telephone number	:	1-855-ASK4YOU (1-855-275-4968)
E-mail address	:	EHSRequests.usa@ask-chemicals.com

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Skin irritation	:	Category 2
Eye irritation	:	Category 2A
Carcinogenicity	:	Category 1A

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H315 Causes skin irritation.
H319 Causes serious eye irritation.
H350 May cause cancer.

Precautionary statements : **Prevention:**
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.

P362 Take off contaminated clothing and wash before reuse.
Storage:
P405 Store locked up.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous components

Chemical name	CAS-No.	Concentration (%)
MICA	12001-26-2	>= 10 - < 20
PYROPHYLLITE	12269-78-2	>= 5 - < 10
QUARTZ / SAND	14808-60-7	>= 1 - < 5
GRAPHITE	7782-42-5	>= 1 - < 5
ATTAPULGITE	12174-11-7	>= 1 - < 5
KAOLIN	1332-58-7	>= 1 - < 5

SECTION 4. FIRST AID MEASURES

General advice : Consult a physician.

If inhaled : Remove person to fresh air. If signs/symptoms continue, get medical attention.

In case of skin contact : Take off contaminated clothing and shoes immediately.
If on skin, rinse well with water.
If on clothes, remove clothes.

In case of eye contact : Remove contact lenses.
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

If swallowed : If swallowed, DO NOT induce vomiting unless directed to do so by medical personnel.

Most important symptoms and effects, both acute and delayed : None known.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Specific hazards during firefighting : Do not use a solid water stream as it may scatter and spread fire.

Cool closed containers exposed to fire with water spray.

Special protective equipment for firefighters : In the event of fire, wear self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures : Use personal protective equipment.
Ensure adequate ventilation.
Evacuate personnel to safe areas.
Keep people away from and upwind of spill/leak.
Material can create slippery conditions.

Environmental precautions : Local authorities should be advised if significant spillages cannot be contained.

Methods and materials for containment and cleaning up : Keep in suitable, closed containers for disposal.
Clean contaminated floors and objects thoroughly while observing environmental regulations.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling : Avoid contact with skin and eyes.
For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the application area.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
MICA	12001-26-2	TWA (Respirable fraction)	3 mg/m3	ACGIH
		TWA (Respirable)	3 mg/m3	NIOSH REL
		TWA (Dust)	20 Million particles per cubic foot	OSHA Z-3
		TWA (Respirable fraction)	3 mg/m3	OSHA P0
		TWA (Respirable)	3 mg/m3	NIOSH REL
		TWA (respirable dust fraction)	3 mg/m3	OSHA P0
		PEL (Respirable dust)	3 mg/m3	CAL PEL
QUARTZ / SAND	14808-60-7	TWA (Res-	0.025 mg/m3	ACGIH

		pirable fraction)		
		TWA (total dust)	30 mg/m3/%SiO2+2	OSHA Z-3
		TWA (respirable)	10 mg/m3/%SiO2+2	OSHA Z-3
		TWA (respirable)	250 mppcf/%SiO2+5	OSHA Z-3
		TWA (Respirable dust)	0.05 mg/m3	NIOSH REL
		TWA (Respirable fraction)	0.1 mg/m3	OSHA P0
		TWA (Respirable dust)	0.05 mg/m3	OSHA Z-1
		PEL (Respirable dust)	0.05 mg/m3	CAL PEL
		TWA (respirable dust fraction)	0.1 mg/m3	OSHA P0
		TWA (Respirable fraction)	0.025 mg/m3 (Silica)	ACGIH
		TWA (Respirable dust)	0.05 mg/m3 (Silica)	NIOSH REL
GRAPHITE	7782-42-5	TWA (Respirable)	2.5 mg/m3	NIOSH REL
		TWA (Dust)	15 Million particles per cubic foot	OSHA Z-3
		TWA (Total)	10 mg/m3	OSHA P0
		TWA (Respirable fraction)	5 mg/m3	OSHA P0
		TWA (total dust)	15 mg/m3	OSHA Z-1
		TWA (respirable fraction)	5 mg/m3	OSHA Z-1
		TWA (Respirable fraction)	2 mg/m3	ACGIH
		TWA (Respirable fraction)	2.5 mg/m3	OSHA P0
		TWA (Total dust)	10 mg/m3	OSHA P0
		TWA (respirable dust fraction)	5 mg/m3	OSHA P0
		PEL (Total dust)	10 mg/m3	CAL PEL
		PEL (respirable dust fraction)	5 mg/m3	CAL PEL
		TWA (respirable dust	2.5 mg/m3	OSHA P0

		fraction)		
		PEL (Respirable dust)	2.5 mg/m3	CAL PEL
KAOLIN	1332-58-7	TWA (Respirable fraction)	2 mg/m3	ACGIH
		TWA (Respirable)	5 mg/m3	NIOSH REL
		TWA (total)	10 mg/m3	NIOSH REL
		TWA (total dust)	15 mg/m3	OSHA Z-1
		TWA (respirable fraction)	5 mg/m3	OSHA Z-1
		TWA (Total)	10 mg/m3	OSHA P0
		TWA (Respirable fraction)	5 mg/m3	OSHA P0
		TWA (Total dust)	10 mg/m3	OSHA P0
		TWA (respirable dust fraction)	5 mg/m3	OSHA P0
		PEL (Respirable dust)	2 mg/m3	CAL PEL

Hazardous components without workplace control parameters

Components	CAS-No.
PYROPHYLLITE	12269-78-2
ATTAPULGITE	12174-11-7

Personal protective equipment

Eye protection : Safety goggles

Protective measures : Wear suitable protective equipment.
Avoid contact with skin.
When using do not eat, drink or smoke.

Hygiene measures : Avoid contact with skin, eyes and clothing.
Wash hands before breaks and immediately after handling the product.
Remove contaminated clothing and protective equipment before entering eating areas.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid

Colour : no data available

Odour : no data available

Odour Threshold : no data available

pH : no data available

Melting point	:	no data available
Boiling point	:	no data available
Flash point	:	not applicable
Evaporation rate	:	no data available
Flammability (solid, gas)	:	no data available
Burning rate	:	no data available
Upper explosion limit	:	no data available
Lower explosion limit	:	no data available
Vapour pressure	:	no data available
Relative vapour density	:	no data available
Relative density	:	no data available
Density	:	1.349 g/cm3
Bulk density	:	no data available
Solubility(ies)		
Water solubility	:	no data available
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Decomposition temperature	:	no data available
Viscosity		
Viscosity, dynamic	:	no data available
Viscosity, kinematic	:	no data available

SECTION 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Skin Absorption

Acute toxicity

Product:

Acute oral toxicity	:	Acute toxicity estimate: > 5,000 mg/kg Method: Calculation method

Components:

GRAPHITE:

Acute oral toxicity	:	LD50 (rat): > 2,000 mg/kg
Acute inhalation toxicity	:	Assessment: The substance or mixture has no acute inhalation toxicity

KAOLIN:

Acute oral toxicity	:	LD50 (rat): > 5,000 mg/kg
Acute dermal toxicity	:	LD50 (rat): > 5,000 mg/kg

Skin corrosion/irritation

Components:

MICA:
Assessment: No skin irritation
Result: No skin irritation

PYROPHYLLITE:
Assessment: Irritating to skin.
Result: Irritating to skin.

QUARTZ / SAND:
Assessment: Irritating to skin.
Result: Irritating to skin.

GRAPHITE:
Assessment: No skin irritation
Result: No skin irritation

ATTAPULGITE:
Assessment: Irritating to skin.
Result: Irritating to skin.

KAOLIN:
Assessment: No skin irritation
Result: No skin irritation

Serious eye damage/eye irritation

Components:

MICA:
Result: No eye irritation
Assessment: No eye irritation

PYROPHYLLITE:
Result: Mild eye irritation
Assessment: Mild eye irritation

QUARTZ / SAND:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

GRAPHITE:
Result: No eye irritation
Assessment: No eye irritation

ATTAPULGITE:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

KAOLIN:
Result: No eye irritation
Assessment: No eye irritation

Respiratory or skin sensitisation

Components:
GRAPHITE:
Species: mouse
Result: Did not cause sensitisation on laboratory animals.

Germ cell mutagenicity

Components:
GRAPHITE:
Genotoxicity in vitro : Remarks: In vitro tests did not show mutagenic effects

Carcinogenicity

Components:
QUARTZ / SAND:
Carcinogenicity - Assessment : Human carcinogen.

ATTAPULGITE:
Carcinogenicity - Assessment : Limited evidence of a carcinogenic effect.

KAOLIN:
Carcinogenicity - Assessment : Possible human carcinogen

IARC	Group 1: Carcinogenic to humans	
	QUARTZ / SAND	14808-60-7
	KAOLIN	1332-58-7
	Group 2B: Possibly carcinogenic to humans	
	ATTAPULGITE	12174-11-7

OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.	
NTP	Known to be human carcinogen	
	QUARTZ / SAND	14808-60-7
	KAOLIN	1332-58-7

Reproductive toxicity

Components:

GRAPHITE:

Effects on fertility	:	Species: rat Application Route: Oral Symptoms: No effects on reproduction parameters.
Effects on foetal development	:	Species: rat Application Route: Oral Symptoms: No specific developmental abnormalities. Method: OECD Test Guideline 422

Further information

Components:

QUARTZ / SAND:
Remarks: Lungs

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

GRAPHITE:

Toxicity to fish	:	LC 50 (Danio rerio (zebra fish)): > 100 mg/l Exposure time: 96 h Test Type: semi-static test Method: OECD Test Guideline 203
Toxicity to daphnia and other aquatic invertebrates	:	EC 50 (Daphnia): > 100 mg/l Exposure time: 48 h Test Type: static test Method: OECD Test Guideline 202
Toxicity to algae	:	NOEC (Pseudokirchneriella subcapitata (green algae)): > 100 mg/l Exposure time: 72 h Test Type: static test

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of wastes in an approved waste disposal facility. Dispose of in accordance with all applicable local, state and federal regulations.

SECTION 14. TRANSPORT INFORMATION

REGULATION
U.S. DOT - ROAD
Not regulated as a dangerous good

U.S. DOT - RAIL
Not regulated as a dangerous good

U.S. DOT - INLAND WATERWAYS
Not regulated as a dangerous good

TRANSPORT CANADA - ROAD
Not regulated as a dangerous good

TRANSPORT CANADA - RAIL
Not regulated as a dangerous good

TRANSPORT CANADA - INLAND WATERWAYS
Not regulated as a dangerous good

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES
Not regulated as a dangerous good

INTERNATIONAL MARITIME DANGEROUS GOODS
Not regulated as a dangerous good

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO

Not regulated as a dangerous good

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

SECTION 15. REGULATORY INFORMATION

TSCA list : The following substance(s) is/are subject to a Significant New Use Rule:

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
METHANOL	67-56-1	5000	*
METHANOL	67-56-1	100	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards : Acute Health Hazard
Chronic Health Hazard

SARA 302 : SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 : SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

California Prop 65

WARNING! This product contains a chemical known to the State of California to cause cancer.

QUARTZ / SAND	14808-60-7
ATTAPULGITE	12174-11-7
KAOLIN	1332-58-7
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	64742-47-8
1,4-DIOXANE	123-91-1
ETHYLENE OXIDE	75-21-8

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

METHANOL	67-56-1
ETHYLENE OXIDE	75-21-8

The components of this product are reported in the following inventories:

DSL : All components of this product are on the Canadian DSL.

AICS	:	Not in compliance with the inventory
NZIoC	:	On the inventory, or in compliance with the inventory
ENCS	:	Not in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PICCS	:	On the inventory, or in compliance with the inventory
IECSC	:	On the inventory, or in compliance with the inventory
TCSI	:	Not in compliance with the inventory
TSCA	:	On TSCA Inventory

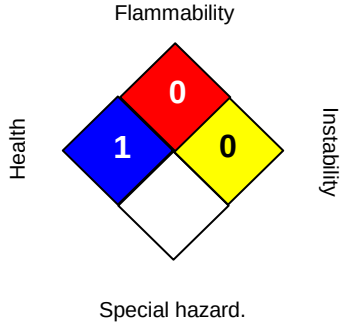
Inventories

AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TSCA (USA)

SECTION 16. OTHER INFORMATION

Further information

NFPA:



HMIS III:

HEALTH	1*
FLAMMABILITY	0
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by ASK's Environmental Health and Safety Department-- EHSrequests.USA@ask-chemicals.com.

Revision Date : 11/01/2018

SAFETY DATA SHEET

Section 1. Identification

Product name Rustilo 4175

SDS # 458532

Historic SDS #: 09027

Code 458532-US03

Relevant identified uses of the substance or mixture and uses advised against

Product use Rust preventive
For specific application advice see appropriate Technical Data Sheet or consult our company representative.

Supplier BP Lubricants USA Inc.
1500 Valley Road
Wayne, NJ 07470
Telephone: +1-888-CASTROL
Product Information: +1-877-641-1600

EMERGENCY HEALTH INFORMATION: +1-800-447-8735

EMERGENCY SPILL INFORMATION: +1-800-424-9300 (CHEMTREC USA)
+1-703-527-3887 (CHEMTREC outside the US)

Section 2. Hazards identification

OSHA/HCS status This material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture Not classified.

GHS label elements

Signal word No signal word.

Hazard statements No known significant effects or critical hazards.

Precautionary statements

Prevention Not applicable.

Response Not applicable.

Storage Not applicable.

Disposal Not applicable.

Hazards not otherwise classified Defatting to the skin.

Section 3. Composition/information on ingredients

Substance/mixture Mixture

Corrosion inhibitors and additives in aqueous solution.

Ingredient name	CAS number	%
Triethanolamine	102-71-6	≤10
Boric acid	10043-35-3	≤3

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

Section 3. Composition/information on ingredients

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Check for and remove any contact lenses. Get medical attention.

Skin contact
Wash skin thoroughly with soap and water or use recognized skin cleanser. Remove contaminated clothing and shoes. Wash clothing before reuse. Get medical attention if symptoms occur. Clean shoes thoroughly before reuse.

Inhalation
If inhaled, remove to fresh air. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours. Get medical attention if symptoms occur.

Ingestion
Do not induce vomiting unless directed to do so by medical personnel. Wash out mouth with water if person is conscious. Get medical attention if symptoms occur.

Protection of first-aiders
No action shall be taken involving any personal risk or without suitable training.

Most important symptoms/effects, acute and delayed

See Section 11 for more detailed information on health effects and symptoms.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician
Treatment should in general be symptomatic and directed to relieving any effects.
In case of inhalation of decomposition products in a fire, symptoms may be delayed.
The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments
No specific treatment.

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media
In case of fire, use water fog, alcohol resistant foam, dry chemical or carbon dioxide extinguisher or spray.

Unsuitable extinguishing media
Do not use water jet.

Specific hazards arising from the chemical
In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous combustion products
Combustion products may include the following:
phosphorus oxides
carbon oxides (CO, CO_2) (carbon monoxide, carbon dioxide)
nitrogen oxides (NO, NO_2 etc.)

Special protective actions for fire-fighters
No action shall be taken involving any personal risk or without suitable training. Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire.

Special protective equipment for fire-fighters
Fire-fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Put on appropriate personal protective equipment. Floors may be slippery; use care to avoid falling.

For emergency responders

If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions

Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill

Stop leak if without risk. Move containers from spill area. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill

Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations. Dispose of via a licensed waste disposal contractor.

Section 7. Handling and storage

Precautions for safe handling

Protective measures

Put on appropriate personal protective equipment (see Section 8). Avoid breathing vapor or mist. Avoid contact of spilled material and runoff with soil and surface waterways. Avoid prolonged or repeated contact with skin. During metal working, solid particles from workpieces or tools will contaminate the fluid and may cause abrasions of the skin. Where such abrasions result in a penetration of the skin, first aid treatment should be applied as soon as reasonably possible. The presence of certain metals in the workpiece or tool, such as chromium, cobalt and nickel, can contaminate the metalworking fluid and as a result may induce allergic skin reactions. Evaporation of water from soluble cutting fluids during use may lead to an increase in concentration which may result in the development of skin conditions due to irritation and defatting. It is important to monitor fluid strength on a regular basis with a refractometer and maintain it at the recommended concentration. Lubricants from other sources and other contaminants should be minimized. Swarf and other debris should be removed. To maintain optimum performance and minimize bacterial spoilage, machine tool coolant systems should be cleaned on a regular basis.

Advice on general occupational hygiene

Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Wash thoroughly after handling. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities

Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Store and use only in equipment/containers designed for use with this product. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. DO NOT ADD NITRITES TO THIS FLUID.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Triethanolamine	**ACGIH TLV (United States).** TWA: 5 mg/m³ 8 hours. Issued/Revised: 9/1994
Boric acid	**ACGIH TLV (United States).** STEL: 6 mg/m³ 15 minutes. Issued/Revised: 1/2005 Form: Inhalable fraction TWA: 2 mg/m³ 8 hours. Issued/Revised: 1/2005 Form: Inhalable fraction

While specific OELs for certain components may be shown in this section, other components may be present in any mist, vapor or dust produced. Therefore, the specific OELs may not be applicable to the product as a whole and are provided for guidance only.

Appropriate engineering controls

All activities involving chemicals should be assessed for their risks to health, to ensure exposures are adequately controlled. Personal protective equipment should only be considered after other forms of control measures (e.g. engineering controls) have been suitably evaluated. Personal protective equipment should conform to appropriate standards, be suitable for use, be kept in good condition and properly maintained.
Your supplier of personal protective equipment should be consulted for advice on selection and appropriate standards. For further information contact your national organisation for standards.
Provide exhaust ventilation or other engineering controls to keep the relevant airborne concentrations below their respective occupational exposure limits.
The final choice of protective equipment will depend upon a risk assessment. It is important to ensure that all items of personal protective equipment are compatible.

Environmental exposure controls

Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures

Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period.
Appropriate techniques should be used to remove potentially contaminated clothing.
Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection

Undiluted fluid: Chemical goggles.
Diluted fluid: Safety glasses with side shields.

Skin protection

Hand protection

Wear suitable gloves. Undiluted fluid: Wear chemical resistant gloves. Recommended: nitrile gloves.
Diluted fluid: Wear protective gloves if prolonged or repeated contact is likely.
Recommended: nitrile gloves. The correct choice of protective gloves depends upon the chemicals being handled, the conditions of work and use, and the condition of the gloves (even the best chemically resistant glove will break down after repeated chemical exposures). Most gloves provide only a short time of protection before they must be discarded and replaced. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Gloves should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions.

Body protection

Use of protective clothing is good industrial practice.
Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Cotton or polyester/cotton overalls will only provide protection against light superficial contamination that will not soak through to the skin. Overalls should be laundered on a regular basis. When the risk of skin exposure is high (e.g. when cleaning up spillages or

Section 8. Exposure controls/personal protection

if there is a risk of splashing) then chemical resistant aprons and/or impervious chemical suits and boots will be required.

Other skin protection

Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection

In case of insufficient ventilation, wear suitable respiratory equipment.
For protection against metal working fluids, respiratory protection that is classified as “resistant to oil” (class R) or oil proof (class P) should be selected where appropriate. Depending on the level of airborne contaminants, an air-purifying, half-mask respirator (with HEPA filter) including disposable (P- or R-series) (for oil mists less than 50mg/m3), or any powered, air-purifying respirator equipped with hood or helmet and HEPA filter (for oil mists less than 125 mg/m3).
Where organic vapours are a potential hazard during metalworking operations, a combination particulate and organic vapour filter may be necessary.
The correct choice of respiratory protection depends upon the chemicals being handled, the conditions of work and use, and the condition of the respiratory equipment. Safety procedures should be developed for each intended application. Respiratory protection equipment should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions.

Section 9. Physical and chemical properties

Appearance

Physical state Liquid.

Color Yellow. [Light]

Odor Not available.

Odor threshold Not available.

pH 9.1 [Conc. (% w/w): 5%]

Melting point Not available.

Boiling point Not available.

Flash point Closed cup: >100°C (>212°F) [Estimated. Water content interferes with flash point determination.]

Evaporation rate Not available.

Flammability (solid, gas) Not applicable. Based on - Physical state

Lower and upper explosive (flammable) limits Not available.

Vapor pressure Not available.

Vapor density Not available.

Density >1000 kg/m³ (>1 g/cm³) at 15.6°C

Solubility Soluble in water.

Partition coefficient: n-octanol/water Not available.

Auto-ignition temperature Not available.

Decomposition temperature Not available.

Viscosity Not available.

Section 10. Stability and reactivity

Reactivity No specific test data available for this product. Refer to Conditions to avoid and Incompatible materials for additional information.

Chemical stability The product is stable.

Possibility of hazardous reactions Under normal conditions of storage and use, hazardous reactions will not occur.
Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 10. Stability and reactivity

Conditions to avoid Avoid excessive heat.

Incompatible materials Reactive or incompatible with the following materials: oxidizing materials.
Slightly reactive or incompatible with the following materials: acids.

Hazardous decomposition products Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Classification

Product/ingredient name	OSHA	IARC	NTP
Triethanolamine	-	3	-

Descriptors:

OSHA:
+ - Potential occupational carcinogen

IARC:
1 - Carcinogenic to human.
2A - Probable human carcinogen.
2B - Possible carcinogen to human.
3 - Not classifiable as a human carcinogen.
4 - Probably not a human carcinogen.

NTP:
Proven - Known to be human carcinogens.
Possible - Reasonably anticipated to be human carcinogens.

Information on the likely routes of exposure Routes of entry anticipated: Dermal, Inhalation.

Potential acute health effects

Eye contact No known significant effects or critical hazards.

Skin contact No known significant effects or critical hazards.

Inhalation Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Ingestion No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact No specific data.

Skin contact Adverse symptoms may include the following:
irritation
dryness
cracking

Inhalation No specific data.

Ingestion No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects Not available.

Potential delayed effects Not available.

Long term exposure

Potential immediate effects Not available.

Potential delayed effects Not available.

Potential chronic health effects

General No known significant effects or critical hazards.

Carcinogenicity No known significant effects or critical hazards.

Mutagenicity No known significant effects or critical hazards.

Section 11. Toxicological information

Teratogenicity No known significant effects or critical hazards.

Developmental effects No known significant effects or critical hazards.

Fertility effects No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	250027 mg/kg

Additional information Alkanolamine: This product contains an alkanolamine. In all metalworking fluids containing amines, there is a potential for forming nitrosamines which are animal carcinogens. Therefore, no nitrites or related nitrosating agents should be added to such compositions.

Section 12. Ecological information

Toxicity

No testing has been performed by the manufacturer.

Persistence and degradability

Expected to be biodegradable.

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{OC}) Not available.

Mobility Liquid. Soluble in water.

Other adverse effects No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods The generation of waste should be avoided or minimized wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Diluted Fluid The spent diluted fluid comprises a relatively stable emulsion. Dispose of via an authorised person/ licensed waste disposal contractor or by other suitable waste treatment techniques (e.g. emulsion splitting, coagulation and filtration) approved by the local authority. Spent fluid should never be disposed of down the drain. The aqueous phase should not be discharged into sewage systems unless provided for by local regulations; the non-aqueous phase should be disposed of as undiluted fluid. Note that separated aqueous solutions or effluents may contain metal salts as well as traces of oil and must be checked for conformity in these respects against consents given by the authorities before disposal. Further treatment may be required.

Section 14. Transport information

	DOT Classification	TDG Classification	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-	-
Transport hazard class(es)	-	-	-	-
Packing group	-	-	-	-
Environmental hazards	No.	No.	No.	No.
Additional information	-	-	-	-

Special precautions for user Not available.

Transport in bulk according to Annex II of MARPOL and the IBC Code Not available.

Section 15. Regulatory information

U.S. Federal regulations

United States inventory (TSCA 8b) All components are listed or exempted.

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 311/312

Classification Not applicable.

SARA 313

Form R - Reporting requirements This product does not contain any hazardous ingredients at or above regulated thresholds.

Supplier notification This product does not contain any hazardous ingredients at or above regulated thresholds.

State regulations

Massachusetts The following components are listed: TRIETHANOLAMINE

New Jersey The following components are listed: BORATE COMPOUNDS, Inorganic; TRIETHANOLAMINE; ETHANOL, 2,2',2"-NITRILOTRIS-

Pennsylvania The following components are listed: ETHANOL, 2,2',2"-NITRILOTRIS-

California Prop. 65

⚠ **WARNING**: This product can expose you to Diethanolamine, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Other regulations

Australia inventory (AICS) All components are listed or exempted.

Canada inventory All components are listed or exempted.

China inventory (IECSC) All components are listed or exempted.

Japan inventory (ENCS) All components are listed or exempted.

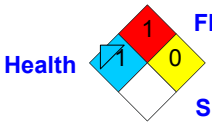
Korea inventory (KECI) All components are listed or exempted.

Section 15. Regulatory information

Philippines inventory (PICCS)	All components are listed or exempted.
Taiwan Chemical Substances Inventory (TCSI)	All components are listed or exempted.
REACH Status	For the REACH status of this product please consult your company contact, as identified in Section 1.

Section 16. Other information

National Fire Protection Association (U.S.A.)



History

Date of issue/Date of revision	06/27/2018.
Date of previous issue	01/11/2018.
Prepared by	Product Stewardship
Key to abbreviations	ACGIH = American Conference of Industrial Hygienists ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor CAS Number = Chemical Abstracts Service Registry Number GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) OEL = Occupational Exposure Limit SDS = Safety Data Sheet STEL = Short term exposure limit TWA = Time weighted average UN = United Nations UN Number = United Nations Number, a four digit number assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods. Varies = may contain one or more of the following 101316-69-2, 101316-70-5, 101316-71-6, 101316-72-7, 64741-88-4, 64741-89-5, 64741-95-3, 64741-96-4, 64741-97-5, 64742-01-4, 64742-44-5, 64742-45-6, 64742-52-5, 64742-53-6, 64742-54-7, 64742-55-8, 64742-56-9, 64742-57-0, 64742-58-1, 64742-62-7, 64742-63-8, 64742-64-9, 64742-65-0, 64742-70-7, 72623-85-9, 72623-86-0, 72623-87-1, 74869-22-0, 90669-74-2

Indicates information that has changed from previously issued version.

Notice to reader

All reasonably practicable steps have been taken to ensure this data sheet and the health, safety and environmental information contained in it is accurate as of the date specified below. No warranty or representation, express or implied is made as to the accuracy or completeness of the data and information in this data sheet.

The data and advice given apply when the product is sold for the stated application or applications. You should not use the product other than for the stated application or applications without seeking advice from BP Group.

It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. The BP Group shall not be responsible for any damage or injury resulting from use, other than the stated product use of the material, from any failure to adhere to recommendations, or from any hazards inherent in the nature of the material. Purchasers of the product for supply to a third party for use at work, have a duty to take all necessary steps to ensure that any person handling or using the product is provided with the information in this sheet. Employers have a duty to tell employees and others who may be affected of any hazards described in this sheet and of any precautions that should be taken. You can contact the BP Group to ensure that this document is the most current available. Alteration of this

Section 16. Other information

document is strictly prohibited.

SAFETY DATA SHEET

Section 1: Product and company identification

Product code WG102922

Product name INDUSTRIQ Primer SB 1K
W110
Zinc Dust Primer

Validation date 6. January 2018

Relevant identified uses of the substance or mixture and uses advised against

Material uses Synthetic resin based coating, used for industrial painting of metal and/or plastic material.

Supplier's details

Worwag Coatings LLC
3420 Kossuth ST
Lafayette, IN 47905
USA
Tel .: (765) 448-9681

Emergency telephone number (with hours of operation) Chemtrec 800-424-9300 (24h)

Section 2: Hazards identification

Classification of the substance or mixture

FLAMMABLE LIQUIDS - Category 3
SKIN SENSITIZATION - Category 1
CARCINOGENICITY - Category 2
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (hearing organs) - Category 2

GHS label elements

Hazard pictograms

Signal word Warning

Hazard statements

H226 - Flammable liquid and vapor.
H317 - May cause an allergic skin reaction.
H351 - Suspected of causing cancer.
H373 - May cause damage to organs through prolonged or repeated exposure. (hearing organs)

Precautionary statements

General Not applicable.

Section 2: Hazards identification

Prevention

P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P280 - Wear protective gloves. Wear eye or face protection. Wear protective clothing.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P241 - Use explosion-proof electrical, ventilating, lighting and all material-handling equipment.
P242 - Use only non-sparking tools.
P243 - Take precautionary measures against static discharge.
P233 - Keep container tightly closed.
P260 - Do not breathe vapor.
P272 (OSHA) - Contaminated work clothing must not be allowed out of the workplace.

Response

P314 - Get medical attention if you feel unwell.
P308 + P313 - IF exposed or concerned: Get medical attention.
P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.
P302 + P352 + P363 - IF ON SKIN: Wash with plenty of soap and water. Wash contaminated clothing before reuse.
P333 + P313 - If skin irritation or rash occurs: Get medical attention.

Storage

P405 - Store locked up.
P403 - Store in a well-ventilated place.
P235 - Keep cool.

Disposal

P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified

None known.

Section 3: Composition/information on ingredients

Substance/mixture Mixture

Ingredient name	%	CAS number
xylene	≤5	1330-20-7
zinc oxide	≤3	1314-13-2
Solvent naphtha (petroleum), light arom.	≤2.5	64742-95-6
Solvent naphtha (petroleum), light arom.	≤2.3	64742-95-6
n-Butyl acetate	≤3	123-86-4
Ethylbenzene	≤1.8	100-41-4
2-methoxy-1-methylethyl acetate	≤3	108-65-6
2-butanone oxime	≤0.3	96-29-7

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4: First aid measures

Description of necessary first aid measures

Eye contact	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Skin contact	Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Ingestion	Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact	No known significant effects or critical hazards.
Inhalation	No known significant effects or critical hazards.
Skin contact	May cause an allergic skin reaction.
Ingestion	No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact	No specific data.
Inhalation	No specific data.
Skin contact	Adverse symptoms may include the following: irritation redness
Ingestion	No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments	No specific treatment.
Protection of first-aiders	No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Section 4: First aid measures

See toxicological information (Section 11)

Section 5: Fire-fighting measures

Extinguishing media

Suitable extinguishing media	Use dry chemical, CO_2, water spray (fog) or foam.
Unsuitable extinguishing media	Do not use water jet.
Specific hazards arising from the chemical	Flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Runoff to sewer may create fire or explosion hazard.
Hazardous thermal decomposition products	Decomposition products may include the following materials: carbon dioxide carbon monoxide metal oxide/oxides
Special protective actions for fire-fighters	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
Special protective equipment for fire-fighters	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
For emergency responders	If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
Environmental precautions	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Section 6: Accidental release measures

Small spill

Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill

Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7: Handling and storage

Precautions for safe handling

Protective measures

Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene

Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Dry coat dust can be autoinflammable. Keep the paint wastes humides and work in water-trickeled cabins, to reduce the danger of autoinflammation.

Conditions for safe storage, including any incompatibilities

Store between the following temperatures: 15 to 25°C (59 to 77°F). Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8: Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
xylene	**ACGIH TLV (United States, 3/2016).** TWA: 100 ppm 8 hours. TWA: 434 mg/m³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 651 mg/m³ 15 minutes. **OSHA PEL 1989 (United States, 3/1989).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 655 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.
zinc oxide	**NIOSH REL (United States, 10/2013).** CEIL: 15 mg/m³ Form: Dust TWA: 5 mg/m³ 10 hours. Form: Dust and fumes STEL: 10 mg/m³ 15 minutes. Form: Fume **OSHA PEL 1989 (United States, 3/1989).** TWA: 5 mg/m³ 8 hours. Form: Fume STEL: 10 mg/m³ 15 minutes. Form: Fume TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 10 mg/m³ 8 hours. Form: Total dust **OSHA PEL (United States, 6/2016).** TWA: 5 mg/m³ 8 hours. Form: Fume TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 15 mg/m³ 8 hours. Form: Total dust **ACGIH TLV (United States, 3/2016).** TWA: 2 mg/m³ 8 hours. Form: Respirable fraction STEL: 10 mg/m³ 15 minutes. Form: Respirable fraction
Solvent naphtha (petroleum), light arom. Solvent naphtha (petroleum), light arom. n-Butyl acetate	None. None. **OSHA PEL 1989 (United States, 3/1989).** TWA: 150 ppm 8 hours. TWA: 710 mg/m³ 8 hours. STEL: 200 ppm 15 minutes. STEL: 950 mg/m³ 15 minutes. **NIOSH REL (United States, 10/2013).** TWA: 150 ppm 10 hours. TWA: 710 mg/m³ 10 hours. STEL: 200 ppm 15 minutes.

Section 8: Exposure controls/personal protection

	STEL: 950 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 150 ppm 8 hours. TWA: 710 mg/m³ 8 hours. **ACGIH TLV (United States, 3/2016).** STEL: 150 ppm 15 minutes. TWA: 50 ppm 8 hours.
Ethylbenzene	**ACGIH TLV (United States, 3/2016).** TWA: 20 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours. STEL: 125 ppm 15 minutes. STEL: 545 mg/m³ 15 minutes. **NIOSH REL (United States, 10/2013).** TWA: 100 ppm 10 hours. TWA: 435 mg/m³ 10 hours. STEL: 125 ppm 15 minutes. STEL: 545 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.
2-methoxy-1-methylethyl acetate	**AIHA WEEL (United States, 10/2011).** TWA: 50 ppm 8 hours.
2-butanone oxime	**AIHA WEEL (United States, 10/2011). Skin sensitizer.** TWA: 10 ppm 8 hours.

Appropriate engineering controls

Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls

Do not allow to enter drains or watercourses.

Individual protection measures

Hygiene measures

Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection

Use safety eyewear designed to protect against splash of liquids.

Skin protection

Hand protection

Barrier creams may help to protect the exposed areas of the skin but should not be applied once exposure has occurred.

Section 8: Exposure controls/personal protection

	The user must check that the final choice of type of glove selected for handling this product is the most appropriate and takes into account the particular conditions of use, as included in the user's risk assessment. The instructions and information provided by the glove manufacturer on use, storage, maintenance and replacement must be followed. Gloves should be replaced regularly and if there is any sign of damage to the glove material. Barrier creams may help to protect the exposed areas of the skin but should not be applied once exposure has occurred. breakthrough time: 6 - 8h Butyl rubber gloves. Thickness of the glove material: 0.5 mm Nitrile gloves. Thickness of the glove material: 0.7 mm
Body protection	Personnel should wear antistatic clothing made of natural fibers or of high-temperature-resistant synthetic fibers.
Other skin protection	Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Respiratory protection	organic vapor (Type A) and particulate filter (Type P1); Fresh-air tube device (DIN EN 138)

Section 9: Physical and chemical properties

Appearance	
Physical state	Liquid.
Color	Gray.
Odor	Not available.
Odor threshold	Not available.
Melting point/freezing point	Not available.
Initial boiling point and boiling range	>70°C (>158°F)
Flash point	Closed cup: 73.4°F (23°C)
Method	Abel-Pensky.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	Lower: 0.8%
Vapor pressure	Not available.
Vapor density	Not available.
Density	3.09 g/cm³
Method	DIN 53217
Solubility	Not available.
Solubility in water	Not available.
Partition coefficient: n-octanol/water	Not available.
Miscible in water.	No.
Auto-ignition temperature	Not available.

Section 9: Physical and chemical properties

Ignition temperature	> 200°C / > 390°F (solvent part)	
Decomposition temperature	Not available.	
Explosive properties	Not available.	
Oxidizing properties	Not available.	
Viscosity	45 to 55	sek 6 mm ISO 23°C
Solids content (by Weight)	87 %	

Aerosol product

No additional information.

Section 10: Stability and reactivity

Reactivity	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	The product is stable.
Possibility of hazardous reactions	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
Incompatible materials	Reactive or incompatible with the following materials: oxidizing materials
Hazardous decomposition products	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11: Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
xylene	LC50 Inhalation Gas.	Rat	5000 ppm	4 hours
	LD50 Oral	Rat	4300 mg/kg	-
n-Butyl acetate	LD50 Dermal	Rabbit	>17600 mg/kg	-
	LD50 Oral	Rat	10768 mg/kg	-
Ethylbenzene	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	3500 mg/kg	-
2-methoxy-1-methylethyl acetate	LD50 Dermal	Rabbit	>5 g/kg	-
	LD50 Oral	Rat	8532 mg/kg	-
2-butanone oxime	LD50 Oral	Rat	930 mg/kg	-

Irritation/Corrosion

Section 11: Toxicological information

Product/ingredient name	Result	Species	Score	Exposure	Observation
xylene	Eyes - Mild irritant	Rabbit	-	87 milligrams	-
	Eyes - Severe irritant	Rabbit	-	24 hours 5 milligrams	-
	Skin - Mild irritant	Rat	-	8 hours 60 microliters	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	100 Percent	-
zinc oxide	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
Solvent naphtha (petroleum), light arom.	Eyes - Mild irritant	Rabbit	-	24 hours 100 microliters	-
Solvent naphtha (petroleum), light arom.	Eyes - Mild irritant	Rabbit	-	24 hours 100 microliters	-
Ethylbenzene	Eyes - Severe irritant	Rabbit	-	500 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 milligrams	-
2-butanone oxime	Eyes - Severe irritant	Rabbit	-	100 microliters	-

Sensitization

Not available.

Mutagenicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Carcinogenicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Classification

Product/ingredient name	OSHA	IARC	NTP
xylene	-	3	-
Ethylbenzene	-	2B	-

Reproductive toxicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Teratogenicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Specific target organ toxicity (single exposure)

Section 11: Toxicological information

Name	Category	Route of exposure	Target organs
xylene	Category 3	Not applicable.	Respiratory tract irritation
Solvent naphtha (petroleum), light arom.	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Solvent naphtha (petroleum), light arom.	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
n-Butyl acetate	Category 3	Not applicable.	Narcotic effects

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
xylene	Category 2	Oral	Not determined
Ethylbenzene	Category 2	Not determined	hearing organs

Aspiration hazard

Name	Result
xylene	ASPIRATION HAZARD - Category 1
Solvent naphtha (petroleum), light arom.	ASPIRATION HAZARD - Category 1
Solvent naphtha (petroleum), light arom.	ASPIRATION HAZARD - Category 1
Ethylbenzene	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure Not available.

Potential acute health effects

Eye contact No known significant effects or critical hazards.

Inhalation No known significant effects or critical hazards.

Skin contact May cause an allergic skin reaction.

Ingestion No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact No specific data.

Inhalation No specific data.

Skin contact Adverse symptoms may include the following:
irritation
redness

Ingestion No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Section 11: Toxicological information

Potential immediate effects Not available.

Potential delayed effects Not available.

Long term exposure

Potential immediate effects Not available.

Potential delayed effects Not available.

Potential chronic health effects

Not available.

General May cause damage to organs through prolonged or repeated exposure. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity No known significant effects or critical hazards.

Teratogenicity No known significant effects or critical hazards.

Developmental effects No known significant effects or critical hazards.

Fertility effects No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	2980.8 mg/kg
Dermal	21905.2 mg/kg
Inhalation (gases)	139815 ppm
Inhalation (vapors)	869.3 mg/l

Section 12: Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
n-Butyl acetate	Acute LC50 32 mg/l Marine water	Crustaceans - Artemia salina	48 hours
	Acute LC50 18000 µg/l Fresh water	Fish - Pimephales promelas	96 hours
Ethylbenzene	Acute EC50 4600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 3600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Acute EC50 6530 µg/l Fresh water	Crustaceans - Artemia sp. - Nauplii	48 hours
	Acute EC50 2930 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 4200 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours

Section 12: Ecological information

2-methoxy-1-methylethyl acetate	EC50 >500 mg/l	Daphnia - Daphnia magna	48 hours
	LC50 161 mg/l	Fish - Pimephales promelas	96 hours
2-butanone oxime	Acute LC50 843000 µg/l Fresh water	Fish - Pimephales promelas	96 hours

Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Solvent naphtha (petroleum), light arom.	-	-	Readily

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
xylene	3.16	-	low
zinc oxide	-	60960	high
Solvent naphtha (petroleum), light arom.	-	10 to 2500	high
n-Butyl acetate	1.78	-	low
Ethylbenzene	3.15	15	low
2-methoxy-1-methylethyl acetate	0.56	-	low
2-butanone oxime	0.63	5.011872336	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) Not available.

Other adverse effects No known significant effects or critical hazards.

Section 13: Disposal considerations

Disposal methods The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 13: Disposal considerations

Waste disposal

The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Xylene	1330-20-7	Listed	U239

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

Section 14: Transport information

	DOT Classification	TDG Classification	Mexico Classification	ADR/RID	IMDG	IATA
UN number	UN1263	UN1263	UN1263	UN1263	UN1263	UN1263
UN proper shipping name	PAINT	PAINT	PAINT	PAINT	PAINT	PAINT
Transport hazard class(es)	3	3	3	3	3	3
Packing group	III	III	III	III	III	III

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Section 14: Transport information

Environmental hazards	No.	Yes.	Yes. The environmentally hazardous substance mark is not required.	Yes.	Yes.	Yes. The environmentally hazardous substance mark is not required.
Additional information	-	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2. 18-2.19 (Class 3), 2.7 (Marine pollutant mark). The marine pollutant mark is not required when transported by road or rail.	-	The environmentally hazardous substance mark is not required when transported in sizes of ≤5 L or ≤5 kg. **Special provisions** 640 (E) **Tunnel code** (D/E)	The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg.	The environmentally hazardous substance mark may appear if required by other transportation regulations.

Special precautions for user

Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code

Not available.

Section 15: Regulatory information

United States

U.S. Federal regulations

Clean Water Act (CWA) 307: Zinc; zinc oxide; Ethylbenzene; Benzene; Toluene; Benzene

Clean Water Act (CWA) 311: xylene; Ethylbenzene; Benzene; Toluene; n-Butyl acetate; Benzene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)

Listed

Date of issue/Date of revision	6. January 2018

Section 15: Regulatory information

Ingredient name	CAS number	Conc.	Conc. Lim. used	Qualifier	Ref. number	Rep. Quantity	Date
Xylenes	1330-20-7	3 - 5	Concentration limit established via list definition was used: ≥0				15/11/1990
Ethyl benzene	100-41-4	1 - 3	Concentration limit established via list definition was used: ≥0				15/11/1990
Benzene	71-43-2	0 - 0.1	Concentration limit established via list definition was used: ≥0				15/11/1990
Toluene	108-88-3	0 - 0.1	Concentration limit established via list definition was used: ≥0				15/11/1990
Benzene	71-43-2	0 - 0.1	Concentration limit established via list definition was used: ≥0				15/11/1990
Cumene	98-82-8	0 - 0.1	Concentration limit established via list definition was used: ≥0				15/11/1990
Cumene	98-82-8	0 - 0.1	Concentration limit established via list definition was used: ≥0				15/11/1990

Clean Air Act Section 183 (e) Control of emissions from certain sources (VOC) With volume exclusion [water excluded] 3.42 lbs/gal (409.8 g/l)

Clean Air Act Section 602 Class I Substances Not listed

Clean Air Act Section 602 Class II Substances Not listed

DEA List I Chemicals (Precursor Chemicals) Not listed

DEA List II Chemicals (Essential Chemicals) Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ Not applicable.

SARA 311/312

Classification Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Section 15: Regulatory information

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
xylene	≤5	Yes.	No.	No.	Yes.	Yes.
Solvent naphtha (petroleum), light arom.	≤2.5	Yes.	No.	No.	Yes.	No.
Solvent naphtha (petroleum), light arom.	≤2.3	Yes.	No.	No.	Yes.	No.
n-Butyl acetate	≤3	Yes.	No.	No.	Yes.	No.
Ethylbenzene	≤1.8	Yes.	No.	No.	Yes.	Yes.
2-methoxy-1-methylethyl acetate	≤3	Yes.	No.	No.	No.	No.
2-butanone oxime	≤0.3	No.	No.	No.	Yes.	Yes.

SARA 313

	Product name	CAS number	Concentration
Form R - Reporting requirements	Zinc xylene zinc oxide Ethylbenzene	7440-66-6 1330-20-7 1314-13-2 100-41-4	≥75 ≤5 ≤3 ≤1.8
Supplier notification	Zinc xylene zinc oxide Ethylbenzene	7440-66-6 1330-20-7 1314-13-2 100-41-4	≥75 ≤5 ≤3 ≤1.8

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations

Massachusetts The following components are listed: ZINC; ZINC OXIDE FUME; XYLENE; DIMETHYLBENZENE; ETHYL BENZENE; ETHYLBENZENE; BUTYL ACETATE; N-BUTYL ACETATE

New York The following components are listed: Zinc; Xylene mixed; Ethylbenzene; Butyl acetate

New Jersey The following components are listed: ZINC; ZINC OXIDE; XYLENES; BENZENE, DIMETHYL-; ETHYL BENZENE; BENZENE, ETHYL-; n-BUTYL ACETATE; ACETIC ACID, BUTYL ESTER

Pennsylvania The following components are listed: ZINC COMPOUNDS; ZINC OXIDE; ZINC OXIDE FUME; BENZENE, DIMETHYL-; BENZENE, ETHYL-; ACETIC ACID, BUTYL ESTER

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.
WARNING: This product contains less than 1% of a chemical known to the State of California to cause birth defects or other reproductive harm.

Section 15: Regulatory information

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
Ethylbenzene	Yes.	No.	41 µg/day (ingestion) 54 µg/day (inhalation)	No.
Cumene	Yes.	No.	No.	No.
Cumene	Yes.	No.	No.	No.
Toluene	No.	Yes.	No.	7000 µg/day (ingestion)
Benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)
Benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)
crystalline silica, non-respirable	Yes.	No.	No.	No.
Quartz (SiO2)	Yes.	No.	No.	No.

United States inventory (TSCA 8b) At least one component is not listed.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

International lists

National inventory

Australia At least one component is not listed.

Canada At least one component is not listed.

China At least one component is not listed.

Europe All components are listed or exempted.

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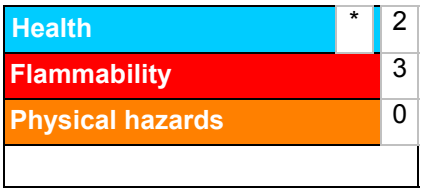
Section 15: Regulatory information

Japan	**Japan inventory (ENCS)**: At least one component is not listed. **Japan inventory (ISHL)**: Not determined.
Malaysia	Not determined.
New Zealand	Not determined.
Philippines	At least one component is not listed.
Republic of Korea	At least one component is not listed.
Taiwan	Not determined.
Turkey	Not determined.

Section 16: Other information

Label requirements FLAMMABLE LIQUID AND VAPOR. CAUSES EYE IRRITATION. MAY CAUSE SKIN IRRITATION. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. POSSIBLE CANCER HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE CANCER, BASED ON ANIMAL DATA.

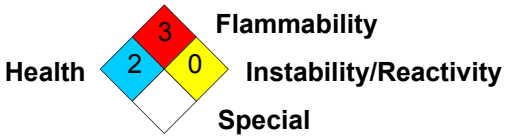
Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Date of issue/Date of revision	6. January 2018

Section 16: Other information

Classification	Justification
FLAMMABLE LIQUIDS - Category 3	On basis of test data
SKIN SENSITIZATION - Category 1	Calculation method
CARCINOGENICITY - Category 2	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (hearing organs) - Category 2	Calculation method

History

Date of issue	6. January 2018
Version	5
Print date	6. January 2018
CEPE code	1
Key to abbreviations	ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) UN = United Nations
References	Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Craig Schmeisser

From: Horvath, Lee <LEE.HORVATH@ask-chemicals.com>
Sent: Monday, August 2, 2021 3:57 PM
To: Craig Schmeisser
Subject: RE: VOC content - Kerntop WV 031 111

I take that back Craig, its actually <0.1% for this product ! ! !

Let me know if you need anything else.

Best Regards,

Lee R Horvath
Business Line Manager – Coatings/Additives, Auxiliaries, Feeding Systems & Metallurgy
lee.horvath@ask-chemicals.com
Office: 614-763-0244
Cell: 440-570-1817

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For further information on data privacy please refer to our privacy notice: https://www.ask-chemicals.com/data-protection

Please consider the environment before printing this e-mail!

From: Horvath, Lee
Sent: Monday, August 2, 2021 3:55 PM
To: Craig Schmeisser <craig.schmeisser@madriverstrategies.com>
Subject: RE: VOC content - Kerntop WV 031 111

Craig,

It would have a very small amount, probably <0.25%

Do you need an exact number? If so, it will take a day or two to get that number.

Let me know.

Best Regards,

Lee R Horvath
Business Line Manager – Coatings/Additives, Auxiliaries, Feeding Systems & Metallurgy
lee.horvath@ask-chemicals.com
Office: 614-763-0244
Cell: 440-570-1817

From: Craig Schmeisser <craig.schmeisser@madriverstrategies.com>
Sent: Monday, August 2, 2021 1:55 PM
To: Horvath, Lee <LEE.HORVATH@ask-chemicals.com>
Subject: VOC content - Kerntop WV 031 111

Hi Lee,
For the core wash used at Fritz Winter, can you tell me if the attached has any VOCs associated with the material. Thanks.

mad river strategies llc
Craig S. Schmeisser
Mad River Strategies, LLC
craig.schmeisser@madriverstrategies.com
614.425.6392

Environmental Data Sheet

Certified Product Data Sheet

This document includes all information required by 40 CFR 63.801 (a) for a Certified Product Data Sheet

Product name	INMOTIQ Primer SB 1K W110 Zinc Dust Primer		
Product code	WG102922	**Product type**	W110
Color	Gray.		
Manufacturer	Worwag Coatings LLC 3420 Kossuth ST Lafayette, IN 47905		

Physical state	Liquid.		
Product Weight [lb/gal]	25.75 +/- 1.0 lb/gal	**Density**	3.09 g/cm³
Flash point	Closed cup: 73.4°F	**Solids content (by Weight)**	87 %

SARA 311/312	FLAMMABLE LIQUIDS - Category 3 SKIN SENSITIZATION - Category 1 CARCINOGENICITY - Category 2 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2

Regulated Ingredients

Chemical/Compound	CAS number	SARA 302 EPA [lbs.]	CERCLA RQ [lbs.]	SARA 313 TC	HAPS 112	[% by Weight]	[% by Volume]
Zinc	7440-66-6		1000 lbs / 454 kg	Yes	No	77.6	239.78
xylene	1330-20-7		100 lbs / 45.4 kg	Yes	Yes	3.89	13.98
zinc oxide	1314-13-2			Yes	No	2.4	1.31
1,2,4-trimethylbenzene	95-63-6			Yes	No	1.81	6.29
Ethylbenzene	100-41-4		1000 lbs / 454 kg	Yes	Yes	0.95	3.39
Cumene	98-82-8		5000 lbs / 2270 kg	Yes	Yes	0.06	0.21
toluene	108-88-3		1000 lbs / 454 kg	Yes	Yes	0.02	0.07
Benzene	71-43-2		10 lbs / 4.54 kg	Yes	Yes	0.01	0.04

Hazardous Air Pollutants (Clean Air Act, Section 112(b))

Volatile HAPS	**[lb/gal]**	0.41
Volatile HAPS	**[lb/gal] of solids**	5.24
Volatile HAPS	**(lb/lb) of solids**	0

VOC content

Total	With volume exclusion [water excluded]	3.42 lbs/gal (409.8 g/l)
	With volume exclusion [water not excluded]	3.42 lbs/gal (409.8 g/l)
[lb/gal] of solids	0	
(lb/lb) of solids	1	

Waste disposal

Waste disposal should be in accordance with applicable federal, state, and local laws. The appropriate method (s) of disposal depend(s) on the product composition at the time of disposal.

The environmental information contained in this product data sheet is based upon Worwag Coatings research and is believed to be reliable, but such information does not constitute a warranty either expressed or implied. As with any coatings material, care and required safety equipment should be utilized when using this product. Keep container tightly sealed and comply with all local safety regulations regarding its transportation, use and storage. The addition of reducers and/or other additives to this product may substantially alter the above data. Refer to the Safety Data Sheet for additional Health, Safety and Environmental information. (Method 24/calculation method was used for this EDS)

SAFETY DATA SHEET

Section 1: Product and company identification

Product code WT102682

Product name REDUCER

Validation date 20. September 2017

Relevant identified uses of the substance or mixture and uses advised against

Material uses Thinner for synthetic resin based coatings for industrial coating of metal and/or plastic material.

Supplier's details

Worwag Coatings LLC
3420 Kossuth ST
Lafayette, IN 47905
USA
Tel .: (765) 448-9681

Emergency telephone number (with hours of operation) Chemtrec 800-424-9300 (24h)

Section 2: Hazards identification

OSHA/HCS status This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

GHS Classification

Classification of the substance or mixture

SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 1
CARCINOGENICITY - Category 2
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (hearing organs) - Category 2
ASPIRATION HAZARD - Category 1

GHS label elements

Hazard pictograms

Signal word Danger

Section 2: Hazards identification

Hazard statements

H318 - Causes serious eye damage.
H315 - Causes skin irritation.
H351 - Suspected of causing cancer.
H304 - May be fatal if swallowed and enters airways.
H335 - May cause respiratory irritation.
H336 - May cause drowsiness and dizziness.
H373 - May cause damage to organs through prolonged or repeated exposure. (hearing organs)

Precautionary statements

General

Not applicable.

Prevention

P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P280 - Wear protective gloves. Wear eye or face protection. Wear protective clothing.
P271 - Use only outdoors or in a well-ventilated area.
P260 - Do not breathe vapor.
P264 - Wash hands thoroughly after handling.

Response

P314 - Get medical attention if you feel unwell.
P308 + P313 - IF exposed or concerned: Get medical attention.
P304 + P340 + P312 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell.
P301 + P310 + P331 - IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting.
P302 + P352 + P362+P364 - IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse.
P332 + P313 - If skin irritation occurs: Get medical attention.
P305 + P351 + P338 + P310 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician.

Storage

P405 - Store locked up.

Disposal

P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified

None known.

See toxicological information (Section 11)

Section 3: Composition/information on ingredients

Substance/mixture Mixture

Ingredient name	%	CAS number
n-Butyl acetate	≥50 - <75	123-86-4
Solvent naphtha (petroleum), light arom.	≥10 - <25	64742-95-6
1,2,4-trimethylbenzene	≥10 - <25	95-63-6
butan-1-ol	≥5 - <10	71-36-3
xylene	≥5 - <10	1330-20-7
Mesitylene	≥3 - <5	108-67-8
Ethylbenzene	≥3 - <5	100-41-4
Cumene	≥0.3 - <1	98-82-8

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

Section 3: Composition/information on ingredients

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4: First aid measures

Description of necessary first aid measures

Eye contact

Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.

Inhalation

Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact

Get medical attention immediately. Call a poison center or physician. Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion

Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact

Causes serious eye damage.

Inhalation

Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. May cause respiratory irritation.

Skin contact

Causes skin irritation.

Ingestion

Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.

Over-exposure signs/symptoms

Section 4: First aid measures

Eye contact	Adverse symptoms may include the following: pain watering redness
Inhalation	Adverse symptoms may include the following: respiratory tract irritation coughing nausea or vomiting headache drowsiness/fatigue dizziness/vertigo unconsciousness
Skin contact	Adverse symptoms may include the following: pain or irritation redness blistering may occur
Ingestion	Adverse symptoms may include the following: stomach pains nausea or vomiting

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments	No specific treatment.
Protection of first-aiders	No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5: Fire-fighting measures

Extinguishing media

Suitable extinguishing media	Use an extinguishing agent suitable for the surrounding fire.
Unsuitable extinguishing media	None known.
Specific hazards arising from the chemical	In a fire or if heated, a pressure increase will occur and the container may burst.
Hazardous thermal decomposition products	Decomposition products may include the following materials: carbon dioxide carbon monoxide

Section 5: Fire-fighting measures

Special protective actions for fire-fighters	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
Special protective equipment for fire-fighters	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
For emergency responders	If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
Environmental precautions	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill	Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
Large spill	Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7: Handling and storage

Precautions for safe handling

Protective measures	Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not swallow. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Section 7: Handling and storage

Advice on general occupational hygiene

Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Dry coat dust can be autoinflammable. Keep the paint wastes humides and work in water-trickeled cabins, to reduce the danger of autoinflammation.

Conditions for safe storage, including any incompatibilities

Store between the following temperatures: 5 to 30°C (41 to 86°F). Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8: Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
n-Butyl acetate	**OSHA PEL 1989 (United States, 3/1989).** TWA: 150 ppm 8 hours. TWA: 710 mg/m³ 8 hours. STEL: 200 ppm 15 minutes. STEL: 950 mg/m³ 15 minutes. **NIOSH REL (United States, 10/2013).** TWA: 150 ppm 10 hours. TWA: 710 mg/m³ 10 hours. STEL: 200 ppm 15 minutes. STEL: 950 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 150 ppm 8 hours. TWA: 710 mg/m³ 8 hours. **ACGIH TLV (United States, 3/2016).** STEL: 150 ppm 15 minutes. TWA: 50 ppm 8 hours.
Solvent naphtha (petroleum), light arom.	None.
1,2,4-trimethylbenzene	**ACGIH TLV (United States, 3/2016).** TWA: 25 ppm 8 hours. TWA: 123 mg/m³ 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 25 ppm 8 hours. TWA: 125 mg/m³ 8 hours. **NIOSH REL (United States, 10/2013).** TWA: 25 ppm 10 hours. TWA: 125 mg/m³ 10 hours.
butan-1-ol	**ACGIH TLV (United States, 3/2016).** TWA: 20 ppm 8 hours.

Section 8: Exposure controls/personal protection

xylene	**OSHA PEL 1989 (United States, 3/1989).** **Absorbed through skin.** CEIL: 50 ppm CEIL: 150 mg/m³ **NIOSH REL (United States, 10/2013).** **Absorbed through skin.** CEIL: 50 ppm CEIL: 150 mg/m³ **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 300 mg/m³ 8 hours. **ACGIH TLV (United States, 3/2016).** TWA: 100 ppm 8 hours. TWA: 434 mg/m³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 651 mg/m³ 15 minutes. **OSHA PEL 1989 (United States, 3/1989).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 655 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.
Mesitylene	**ACGIH TLV (United States, 3/2016).** TWA: 25 ppm 8 hours. TWA: 123 mg/m³ 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 25 ppm 8 hours. TWA: 125 mg/m³ 8 hours. **NIOSH REL (United States, 10/2013).** TWA: 25 ppm 10 hours. TWA: 125 mg/m³ 10 hours.
Ethylbenzene	**ACGIH TLV (United States, 3/2016).** TWA: 20 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours. STEL: 125 ppm 15 minutes. STEL: 545 mg/m³ 15 minutes. **NIOSH REL (United States, 10/2013).** TWA: 100 ppm 10 hours. TWA: 435 mg/m³ 10 hours. STEL: 125 ppm 15 minutes. STEL: 545 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.
Cumene	**OSHA PEL 1989 (United States, 3/1989).** **Absorbed through skin.** TWA: 50 ppm 8 hours.

Section 8: Exposure controls/personal protection

	TWA: 245 mg/m³ 8 hours. **NIOSH REL (United States, 10/2013).** **Absorbed through skin.** TWA: 50 ppm 10 hours. TWA: 245 mg/m³ 10 hours. **ACGIH TLV (United States, 3/2016).** TWA: 50 ppm 8 hours. **OSHA PEL (United States, 2/2013).** **Absorbed through skin.** TWA: 50 ppm 8 hours. TWA: 245 mg/m³ 8 hours.

Appropriate engineering controls Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Consult local authorities for acceptable exposure limits.

Individual protection measures

Hygiene measures Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/ or face shield. If inhalation hazards exist, a full-face respirator may be required instead.

Skin protection

Hand protection Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Section 8: Exposure controls/personal protection

Respiratory protection	Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9: Physical and chemical properties

Appearance

Physical state	Liquid.
Color	Colorless.
Odor	Not available.
Odor threshold	Not available.
Melting point	Not available.
Boiling point	>70°C (>158°F)
Flash point	Closed cup: 212°F (100°C)
Method	Abel-Pensky.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	Lower: 0.8%
Ignition temperature	> 200°C / > 390°F (solvent part)
Vapor pressure	Not available.
Vapor density	Not available.
Density	0.87 g/cm³
Method	DIN 53217
Solubility	Not available.
Miscible in water.	No.
Partition coefficient: n-octanol/water	Not available.
Solids content (by Weight)	0 %
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.

Section 10: Stability and reactivity

Reactivity	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	The product is stable.
Possibility of hazardous reactions	Under normal conditions of storage and use, hazardous reactions will not occur.

Section 10: Stability and reactivity

Conditions to avoid No specific data.

Incompatible materials No specific data.

Hazardous decomposition products Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11: Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
n-Butyl acetate	LD50 Dermal	Rabbit	>17600 mg/kg	-
	LD50 Oral	Rat	10768 mg/kg	-
1,2,4-trimethylbenzene	LC50 Inhalation Vapor	Rat	18000 mg/m³	4 hours
	LD50 Oral	Rat	5 g/kg	-
butan-1-ol	LC50 Inhalation Vapor	Rat	24000 mg/m³	4 hours
	LD50 Dermal	Rabbit	3400 mg/kg	-
	LD50 Oral	Rat	790 mg/kg	-
xylene	LC50 Inhalation Gas.	Rat	5000 ppm	4 hours
	LD50 Oral	Rat	4300 mg/kg	-
Mesitylene	LC50 Inhalation Vapor	Rat	24000 mg/m³	4 hours
	LD50 Oral	Rat	5000 mg/kg	-
Ethylbenzene	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	3500 mg/kg	-
Cumene	LC50 Inhalation Vapor	Rat	39000 mg/m³	4 hours
	LD50 Oral	Rat	1400 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Solvent naphtha (petroleum), light arom.	Eyes - Mild irritant	Rabbit	-	24 hours 100 microliters	-
butan-1-ol	Eyes - Severe irritant	Rabbit	-	24 hours 2 milligrams	-
	Eyes - Severe irritant	Rabbit	-	0.005 Mililiters	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-
xylene	Eyes - Mild irritant	Rabbit	-	87 milligrams	-
	Eyes - Severe irritant	Rabbit	-	24 hours 5 milligrams	-
	Skin - Mild irritant	Rat	-	8 hours 60 microliters	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	100 Percent	-
Mesitylene	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-

Section 11: Toxicological information

Ethylbenzene	Eyes - Severe irritant	Rabbit	-	500 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 milligrams	-
Cumene	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Eyes - Mild irritant	Rabbit	-	86 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 10 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 100 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Carcinogenicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Classification

Product/ingredient name	OSHA	IARC	NTP
xylene	-	3	-
Ethylbenzene	-	2B	-
Cumene	-	2B	Reasonably anticipated to be a human carcinogen.

Reproductive toxicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Teratogenicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
n-Butyl acetate	Category 3	Not applicable.	Narcotic effects
Solvent naphtha (petroleum), light arom.	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
1,2,4-trimethylbenzene	Category 3	Not applicable.	Respiratory tract irritation
butan-1-ol	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects

Section 11: Toxicological information

xylene	Category 3	Not applicable.	Respiratory tract irritation
Mesitylene	Category 3	Not applicable.	Respiratory tract irritation
Cumene	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
xylene	Category 2	Oral	Not determined
Ethylbenzene	Category 2	Not determined	hearing organs

Aspiration hazard

Name	Result
Solvent naphtha (petroleum), light arom.	ASPIRATION HAZARD - Category 1
1,2,4-trimethylbenzene	ASPIRATION HAZARD - Category 1
xylene	ASPIRATION HAZARD - Category 1
Ethylbenzene	ASPIRATION HAZARD - Category 1
Cumene	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure Not available.

Potential acute health effects

Eye contact Causes serious eye damage.

Inhalation Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. May cause respiratory irritation.

Skin contact Causes skin irritation.

Ingestion Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact Adverse symptoms may include the following:
pain
watering
redness

Inhalation Adverse symptoms may include the following:
respiratory tract irritation
coughing
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness

Section 11: Toxicological information

Skin contact	Adverse symptoms may include the following: pain or irritation redness blistering may occur
Ingestion	Adverse symptoms may include the following: stomach pains nausea or vomiting

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects	Not available.
Potential delayed effects	Not available.

Long term exposure

Potential immediate effects	Not available.
Potential delayed effects	Not available.

Potential chronic health effects

Not available.

General	May cause damage to organs through prolonged or repeated exposure.
Carcinogenicity	Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.
Mutagenicity	No known significant effects or critical hazards.
Teratogenicity	No known significant effects or critical hazards.
Developmental effects	No known significant effects or critical hazards.
Fertility effects	No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	4931.7 mg/kg
Dermal	6917.2 mg/kg
Inhalation (gases)	90930.1 ppm
Inhalation (vapors)	114.5 mg/l

Section 12: Ecological information

Ecotoxicity No known significant effects or critical hazards.

Toxicity

Product/ingredient name	Result	Species	Exposure
n-Butyl acetate	Acute LC50 32 mg/l Marine water	Crustaceans - Artemia salina	48 hours
	Acute LC50 18000 µg/l Fresh water	Fish - Pimephales promelas	96 hours
Ethylbenzene	Acute EC50 4600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 3600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Acute EC50 6530 µg/l Fresh water	Crustaceans - Artemia sp. - Nauplii	48 hours
	Acute EC50 2930 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 4200 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours
Cumene	Acute EC50 2600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 7400 µg/l Fresh water	Crustaceans - Artemia sp. - Nauplii	48 hours
	Acute EC50 10600 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 2700 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours

Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
butan-1-ol	-	-	Readily

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
n-Butyl acetate	1.78	-	low
1,2,4-trimethylbenzene	3.63	-	low
butan-1-ol	0.88	-	low
xylene	3.16	-	low
Mesitylene	3.42	-	low
Ethylbenzene	3.15	15	low
Cumene	3.66	94.69	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) Not available.

Other adverse effects No known significant effects or critical hazards.

Section 13: Disposal considerations

Disposal methods

The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

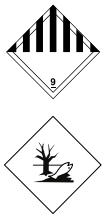
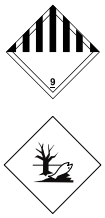
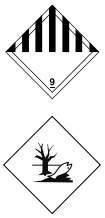
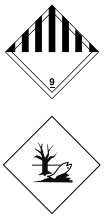
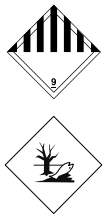
United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Xylene	1330-20-7	Listed	U239
1-Butanol (I); n-Butyl alcohol (I)	71-36-3	Listed	U031

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

Section 14: Transport information

	DOT Classification	TDG Classification	Mexico Classification	ADR/RID	IMDG	IATA
UN number	UN3082	UN3082	UN3082	UN3082	UN3082	UN3082
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (xylene, n-Butyl acetate)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Solvent naphtha (petroleum), light arom., 1,2, 4-trimethylbenzene)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Solvent naphtha (petroleum), light arom., 1,2, 4-trimethylbenzene)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Solvent naphtha (petroleum), light arom., 1,2, 4-trimethylbenzene)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Solvent naphtha (petroleum), light arom., 1,2, 4-trimethylbenzene)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Solvent naphtha (petroleum), light arom., 1,2, 4-trimethylbenzene)
Transport hazard class(es)	9	9 	9 	9 	9 	9 
Packing group	III	III	III	III	III	III

Date of issue/Date of revision	20. September 2017

Section 14: Transport information

Environmental hazards	No.	Yes.	Yes.	Yes.	Yes.	Yes.
Additional information	**Reportable quantity** 1818.6 lbs / 825.65 kg [250.7 gal / 949.02 L] The classification of the product is due solely to the presence of one or more US DOT-listed 'Hazardous substances' that are subject to reportable quantity requirements and only applies to shipments of packages greater than, or equal to, the product reportable quantity. Package sizes less than the product reportable quantity are not regulated as hazardous materials.	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.43-2.45 (Class 9), 2.7 (Marine pollutant mark). Non-bulk packages of this product are not regulated as dangerous goods when transported by road or rail.	The environmentally hazardous substance mark is not required when transported in sizes of ≤5 L or ≤5 kg.	This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8. **Tunnel code** (E)	This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.	This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 5.0.2.4.1, 5.0.2.6.1.1 and 5.0.2.8.

Special precautions for user

Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code

Not available.

Section 15: Regulatory information

U.S. Federal regulations

Clean Water Act (CWA) 307: Benzene; Ethylbenzene; Benzene

Clean Water Act (CWA) 311: n-Butyl acetate; xylene; Benzene; Ethylbenzene; Benzene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) Listed

Ingredient name	CAS number	Conc.	Conc. Lim. used	Qualifier	Ref. number	Rep. Quantity	Date
Xylenes	1330-20-7	5 - 10	Concentration limit established via list definition was used: ≥1				15/11/1990
Ethyl benzene	100-41-4	3 - 5	Concentration limit established via list definition was used: ≥1				15/11/1990

Clean Air Act Section 183 (e) Control of emissions from certain sources (VOC) With volume exclusion [water excluded] 7.26 lbs/gal (870 g/l)

Clean Air Act Section 602 Class I Substances Not listed

Clean Air Act Section 602 Class II Substances Not listed

DEA List I Chemicals (Precursor Chemicals) Not listed

DEA List II Chemicals (Essential Chemicals) Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ Not applicable.

SARA 311/312

Classification Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard

Section 15: Regulatory information

n-Butyl acetate	≥50 - <75	Yes.	No.	No.	Yes.	No.
Solvent naphtha (petroleum), light arom.	≥10 - <25	Yes.	No.	No.	Yes.	No.
1,2,4-trimethylbenzene	≥10 - <25	Yes.	No.	No.	Yes.	No.
butan-1-ol	≥5 - <10	Yes.	No.	No.	Yes.	No.
xylene	≥5 - <10	Yes.	No.	No.	Yes.	Yes.
Mesitylene	≥3 - <5	Yes.	No.	No.	Yes.	No.
Ethylbenzene	≥3 - <5	Yes.	No.	No.	Yes.	Yes.
Cumene	≥0.3 - <1	Yes.	No.	No.	Yes.	Yes.

SARA 313

	Product name	CAS number	Concentration
Form R - Reporting requirements	1,2,4-trimethylbenzene butan-1-ol xylene Ethylbenzene	95-63-6 71-36-3 1330-20-7 100-41-4	≥10 - <25 ≥5 - <10 ≥5 - <10 ≥3 - <5
Supplier notification	1,2,4-trimethylbenzene butan-1-ol xylene Ethylbenzene	95-63-6 71-36-3 1330-20-7 100-41-4	≥10 - <25 ≥5 - <10 ≥5 - <10 ≥3 - <5

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations

Massachusetts The following components are listed: BUTYL ACETATE; N-BUTYL ACETATE; PSEUDOCUMENE; XYLENE; DIMETHYLBENZENE; MESITYLENE; 1,3,5 TRIMETHYL BENZENE; ETHYL BENZENE; ETHYLBENZENE; N-BUTYL ALCOHOL; 1-BUTANOL

New York The following components are listed: Butyl acetate; Cumene; Benzene, 1-methylethyl-; Xylene mixed; Ethylbenzene; Butyl alcohol; 1-Butanol

New Jersey The following components are listed: n-BUTYL ACETATE; ACETIC ACID, BUTYL ESTER; PSEUDOCUMENE; 1,2,4-TRIMETHYL BENZENE; CUMENE; BENZENE, (1-METHYLETHYL)-; XYLENES; BENZENE, DIMETHYL-; TRIMETHYL BENZENE (mixed isomers); BENZENE, TRIMETHYL-; ETHYL BENZENE; BENZENE, ETHYL-; n-BUTYL ALCOHOL; 1-BUTANOL

Pennsylvania The following components are listed: ACETIC ACID, BUTYL ESTER; PSEUDOCUMENE; BENZENE, (1-METHYLETHYL)-; BENZENE, DIMETHYL-; BENZENE, ETHYL-; 1-BUTANOL

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.
WARNING: This product contains less than 1% of a chemical known to the State of California to cause birth defects or other reproductive harm.

Section 15: Regulatory information

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
Ethylbenzene	Yes.	No.	41 µg/day (ingestion) 54 µg/day (inhalation)	No.
Cumene	Yes.	No.	No.	No.
Benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)
Benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)

United States inventory (TSCA 8b) All components are listed or exempted.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Inform Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

International lists

National inventory

Australia All components are listed or exempted.
Canada All components are listed or exempted.
China All components are listed or exempted.
Europe All components are listed or exempted.
Japan All components are listed or exempted.
Malaysia Not determined.
New Zealand All components are listed or exempted.
Philippines All components are listed or exempted.
Republic of Korea All components are listed or exempted.
Taiwan All components are listed or exempted.

Section 16: Other information

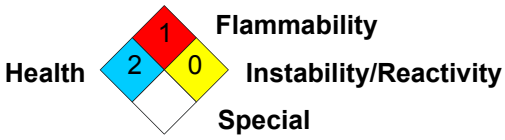
Hazardous Material Information System (U.S.A.)

Health	*	2
Flammability		1
Physical hazards		0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
Skin Irrit. 2, H315	Calculation method
Eye Dam. 1, H318	Calculation method
Carc. 2, H351	Calculation method
STOT SE 3, H335	Calculation method
STOT SE 3, H336	Calculation method
STOT RE 2, H373 (hearing organs)	Calculation method
Asp. Tox. 1, H304	Calculation method

History

Date of issue	20. September 2017
Version	3
Print date	20. September 2017

Section 16: Other information

Key to abbreviations	ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) UN = United Nations
References	Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Technical Data Sheet

Product Name: Wörwag – Reducing Solvent Blend for WG102922
Worwag Code: WT102682 Technology Code:

Color name:	Color code:

Performance Properties	:	Solvent blend for WG102922
Storage information	:	Shelf life 24 months stored @ 50-85° F
Chemical characterization	:	Blend of organic solvents

Physical Properties as supplied		
Viscosity	:	
Density	:	0.87 +/- 0.05 g/ml
Wt./Gallon	:	7.26 +/- 0.2 lbs/gal
PH	:	
Weight / Volume solid	:	
VOC	:	7.26 +/- 0.2 lbs/gal
HAPs by wt	:	

Physical Properties as applied	
Activator	:
Activator Ratio	:
Reducer / Ratio	:
Applied Viscosity	:
Pot life	:

Application Properties	
Stir instruction	:
Film thickness (dry film)	:
Theoretical Coverage	:
Substrate	:
Pretreatment	:
Application method	:
Spray application	:
gun nozzle	:
pressure	:
Flash off	:
Curing schedule	:
Gloss	:

The technical information contained in this product data sheet and suggestions with reference to its application is based upon Worwag Coatings research and are believed to be reliable, but such information do not constitute a warranty either expressed or implied. As with any coatings material care and required safety equipment should be utilized when using this product. Avoid any contact with skin or eyes. Adequate ventilation should be provided. Keep away from heat, sparks or flames. Keep container tightly sealed and comply with all local safety regulations regarding its transportation, use and storage. Refer to Material Safety Data Sheet (MSDS) for additional Health, Safety and Environmental information.

1 IDENTIFICATION

Product Name:	**GEOMET® 360**
Product Code(s):	GMT1196
Manufacturer:	NOF Metal Coatings North America Inc. 275 Industrial Parkway, Chardon, Ohio 44024 Office: 440-285-2231 Fax: 440-285-5009
Emergency Phone:	CHEMTREC: +1 703-741-5970 / 1-800-424-9300

2 HAZARDS IDENTIFICATION

Signal Word: **DANGER**

HAZARD CLASSIFICATION

Germ Cell Mutagenicity	Category 1B
Toxic to Reproduction	Category 1B
Specific Target Organ Toxicity (SE)	Category 2
Eye Damage/ Irritation	Category 2A

HAZARD STATEMENTS

H319	Causes serious eye irritation.
H340	May cause genetic defects.
H360	May damage fertility or the unborn child.
H371	May cause damage to organs.

PRECAUTIONARY STATEMENTS

PREVENTION

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe fumes, mist, vapors or spray.
P264	Wash hands thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P280	Wear protective gloves and eye/face protection.

RESPONSE

P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313	IF exposed or concerned: Get medical attention.
P337+P313	If eye irritation persists: Get medical attention.

STORAGE

P405	Store locked up.

DISPOSAL

P501	Dispose of contents and container in accordance with all applicable regulations.

3 COMPOSITION / INFORMATION ON INGREDIENTS

Product is a mixture of the substances listed below with nonhazardous additions.

COMPONENT	CAS NUMBER	WEIGHT %
Zinc Powder (stabilized)	7440-66-6	20 – 30
Aluminum Powder (stabilized)	7429-90-5	6 – 11
Methanol	67-56-1	< 4
Distillates (petroleum), hydrotreated light	64742-47-8	< 2
Naphtha (petroleum), hydrotreated heavy	64742-48-9	< 2
Boric Acid	10043-35-3	< 1
Solvent naphtha (petroleum), light aromatic	64742-95-6	< 1

Any concentration shown as a range is to protect product confidentiality or is due to batch variation.

In accordance with paragraph (i) of §1910.1200, specific chemical identities and exact concentration of composition of this product have been withheld as a trade secret.

4 FIRST-AID MEASURES

Eyes:	Flush immediately with plenty of clean, lukewarm water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Skin:	Generally, this product does not irritate the skin.
Inhalation:	If overcome by exposure, remove victim to fresh air immediately. Consult doctor if irritation occurs.
Ingestion:	Do not induce vomiting. If affected person is fully conscious, wash out mouth with water and give 2-3 glasses of water to drink. Consult doctor if irritation occurs.

5 FIRE-FIGHTING MEASURES

Suitable Extinguishing Media:	Extinguishing powder, CO_2, water spray or alcohol resistant foam.
Unsuitable Extinguishing Media:	No further relevant information available.
Special Procedures:	No special measures required.
Hazardous Combustion Products:	No further relevant information available.

6 ACCIDENTAL RELEASE MEASURES

Precautions:	Use appropriate protective equipment. Keep unprotected persons away.
Environmental:	Do not allow to enter sewers/ surface or ground water.
Containment:	Absorb with liquid-binding material (sand, dolomite, universal binders, or sawdust). Use neutralizing agent. Ensure adequate ventilation. Do not flush with water or aqueous agents.
Waste Disposal:	Dispose of collected material in compliance with local, state and federal regulations.

7 HANDLING AND STORAGE

Storage:	Store in a cool, dry, well-ventilated area. Avoid exposure to excessive heat for long periods of time. Avoid direct sunlight.
Handling:	Ensure good ventilation/ exhaustion at the workplace. Open and handle receptacle with care. Prevent formation of aerosols.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS

COMPONENT	TYPE	VALUE
Methanol (CAS# 67-56-1)	OSHA PEL NIOSH REL ACGIH TLV	TWA: 260 mg/m^3 (200 ppm) TWA: 260 mg/m^3 (200 ppm) ST: 325 mg/m^3 (250 ppm) TWA: 262 mg/m^3 (200 ppm) ST: 328 mg/m^3 (250 ppm)
Boric Acid (CAS# 10043-35-3)	ACGIH TLV	TWA: 3 mg/m^3 ST: 6 mg/m^3

EXPOSURE CONTROLS

Ventilation & Engineering Measures:	Use ventilation if possible, e.g., fans or exhaust systems, to keep vapor levels below recommended exposure limits.
Respiratory Protection:	If adequate ventilation is not available, wear a NIOSH-approved respirator for protection against fumes, vapors, mists and spray.
Eye Protection:	Wear safety goggles or safety glasses with unperforated side shields and a face shield.
Skin Protection:	Wear chemical resistant gloves and long sleeves to minimize skin exposure. Contaminated clothing, including shoes, should be stored separately, and cleaned before reusing.
Other:	Do not eat or drink in area where product is used. Wash hands after handling.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Metallic grey liquid.
Odor:	N/D
Odor Threshold:	N/D
Boiling Point:	100°C (212°F)
Melting Point/Freezing point:	N/A
Vapor Pressure (mm of Hg @ 20˚C):	N/D
Vapor Density (AIR=1):	N/D
Relative Density:	N/D
Specific Gravity (Water=1):	1.3 – 1.4
pH:	6 – 9
Solubility in Water:	N/A
Evaporation Rate (n-Butyl Acetate=1):	Equal to water.
Viscosity:	N/D
Partition Coefficient (n-octanol/water):	N/D
Decomposition Temperature:	N/D
Flashpoint:	101°F (PMCC) (Does NOT sustain combustion per ASTM 4206)
Auto-ignition Temperature:	N/A
Flammability Limits	
UFL (% by volume):	N/A
LFL (% by volume):	N/A

10 STABILITY AND REACTIVITY

Chemical Stability:	Stable under normal conditions.
Conditions to Avoid:	Isolate from extreme heat and cold.
Incompatible Materials:	No further relevant information available.
Hazardous Decomposition Products:	No dangerous decomposition products known.
Hazardous Polymerization:	Will not occur under normal conditions.

11 TOXICOLOGICAL INFORMATION

Routes of Exposure: Eye/Skin contact, inhalation and ingestion.

ACUTE HEALTH HAZARDS

Eyes:	Exposure to eyes will cause serious irritation.
Skin:	No irritant effect.
Inhalation:	Prolonged exposure can cause inheritable damage.

INFORMATION ON TOXICOLOGICAL EFFECTS

Serious Eye Damage/Irritation:	Causes serious eye damage.
Respiratory/Skin Sensitization:	No sensitizing effects known.
Germ Cell Mutagenicity:	May cause genetic defects.
Reproductive Toxicity:	May damage fertility or the unborn child.
Specific Organ Toxicity:	May cause damage to organs.

COMPONENT ACUTE TOXICOLOGICAL INFORMATION

COMPONENT	TEST	SPECIES	RESULT
Methanol (CAS# 67-56-1)	Oral LD_{50} Dermal LD_{50}	Rat Rabbit	5628 mg/kg 15800 mg/kg
Nonylphenol, Ethoxylated (CAS# 9016-45-9)	Oral LD_{50} Dermal LD_{50} Inhalative LC_{50}/4 h	Rat Rabbit Rat	>4290 mg/kg 2500 mg/kg >21.3 mg/l
Boric Acid (CAS# 10043-35-3)	Oral LD_{50}	Rat	2660 mg/kg
Naphtha (petroleum), hydrotreated heavy (CAS# 64742-48-9)	Oral LD_{50} Dermal LD_{50}	Rat Rabbit	>5000 mg/kg >3000 mg/kg
Solvent Naphtha, light aromatic (CAS# 64742-95-6)	Oral LD_{50} Dermal LD_{50} Inhalative LC_{50}/4 h	Rat Rabbit Rat	>6800 mg/kg >3400 mg/kg >10.2 mg/l

Information is based on data from components or similar materials.

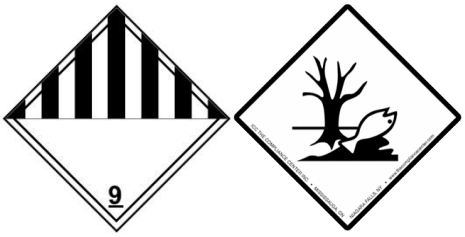
12 ECOLOGICAL INFORMATION

Ecological effects of this product mixture have not been tested.

13 DISPOSAL CONSIDERATIONS

Waste Disposal:	Dispose of in accordance with federal, state, and local regulations. The generation of waste should be avoided or minimized whenever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Do not flush to drain/storm sewer.
Packaging Disposal:	Empty containers should be taken to a licensed waste handling site for recycling or disposal, since emptied containers may contain product residue. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Follow all label warnings even after containers are emptied.

14 TRANSPORT INFORMATION

UN Number:	UN3082
Shipping Name:	
DOT:	Not Regulated.
IMDG:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (ZINC, ETHOXYLATED NONYLPHENOL), MARINE POLLUTANT
IATA:	Environmentally hazardous substance, liquid, n.o.s. (Zinc, Ethoxylated Nonylphenol)
Packing Group:	III
Hazard Class:	9 Miscellaneous dangerous substances and articles.
IMDG/ IATA Label:	

15 REGULATORY INFORMATION

US REGULATORY INFORMATION

SARA § 313 Reportable Ingredients:	Methanol (CAS# 67-56-1)
SARA § 302 EHS TPQ:	None.
SARA § 304 EHS RQ:	None.
CERCLA RQ:	Zinc (CAS# 7440-66-6): 1000 lbs. Methanol (CAS# 67-56-1): 5000 lbs.
TSCA 8(b):	All of the components of this product are listed on the TSCA Inventory.
Clean Water Act:	None.
Clean Air Act:	None.

NFPA:

HMIS:

HEALTH	1
FLAMMABILITY	2
REACTIVITY	0
PERSONAL PROTECTION	D

16 OTHER INFORMATION

SDS Date:	04/12/2016
Revision Date:	08/24/2017

This Safety Data Sheet was prepared in accordance with 29 CFR 1910.1200. All information, recommendations and suggestions appearing herein concerning our product are based on tests and data believed to be reliable; however, it is the users' responsibility to determine the safety, toxicity and suitability for his own use of the product described herein. Since the actual use by others is beyond our control, no guarantee expressed or implied is made by NOF Metal Coatings North America Inc. as to the effects of such use, the results to be obtained, or the safety and toxicity of the product, nor does NOF Metal Coatings North America Inc. assume any liability arising out of use by others of the product referred to herein. Nor is the information herein to be construed as absolutely complete, since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations.

NOF METAL COATINGS NORTH AMERICA

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AIR QUALITY DATA SHEET

The data given below is for the composition of the product as formulated. Variations may occur on individual batches because of adjustments made during production.

PRODUCT: GEOMET® 360

Product Codes: GMT1196

GEOMET® 360	Value	Unit	Method
Volume % NVM	17.6	%	ASTM D2697
Weight % HAP	3.4	%	Calculated
Density	11.05	lbs/gal	ASTM D1475
VOC + Exempt	1.6	lbs/gal	EPA 24
VOC - Exempt	4.0	lbs/gal	EPA 24

HAP Content	CAS	Wt %
Methanol	67-56-1	3.4

Please Note: This information is provided for the sole purpose of assisting you in complying with reporting requirements and should not be used or distributed for any other purpose.

BRO:09022015

Water

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 11/15/2013 Revision date: 06/12/2018 Supersedes: 01/25/2017 Version: 1.3

SECTION 1: Identification

1.1. Identification

Product form : Substance

Substance name : Water

CAS-No. : 7732-18-5

Product code : LC26750

Formula : H2O

1.2. Recommended use and restrictions on use

Use of the substance/mixture : For laboratory and manufacturing use only.

Recommended use : Laboratory chemicals

Restrictions on use : Not for food, drug or household use

1.3. Supplier

LabChem Inc
Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court
Zelienople, PA 16063 - USA
T 412-826-5230 - F 724-473-0647
info@labchem.com - www.labchem.com

1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or +1-703-741-5970

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS-US classification

Not classified

2.2. GHS Label elements, including precautionary statements

Not classified as a hazardous chemical.

Other hazards not contributing to the classification : None.

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substances

Substance type : Mono-constituent

Name	Product identifier	%	GHS-US classification
Water (Main constituent)	(CAS-No.) 7732-18-5	100	Not classified

Full text of hazard classes and H-statements : see section 16

3.2. Mixtures

Not applicable

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures general : If you feel unwell, seek medical advice (show the label where possible).

First-aid measures after inhalation : Allow victim to breathe fresh air. Allow the victim to rest. Adverse effects not expected from this product.

First-aid measures after skin contact : Adverse effects not expected from this product. Take off contaminated clothing.

First-aid measures after eye contact : Adverse effects not expected from this product.

First-aid measures after ingestion : Do NOT induce vomiting. Adverse effects not expected from this product.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects : Not expected to present a significant hazard under anticipated conditions of normal use.

4.3. Immediate medical attention and special treatment, if necessary

Treat symptomatically.

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand.

5.2. Specific hazards arising from the chemical

No additional information available

5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire.

Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Emergency procedures : Evacuate unnecessary personnel.

6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Ventilate area.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Keep container closed when not in use.

Incompatible products : Metallic sodium.

Incompatible materials : Sources of ignition. Direct sunlight.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

No additional information available

8.2. Appropriate engineering controls

Appropriate engineering controls : Provide adequate general and local exhaust ventilation.

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment:

Gloves. Safety glasses.

Hand protection:

Wear protective gloves.

Eye protection:

Chemical goggles or safety glasses

Respiratory protection:

None necessary.

Other information:

Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Liquid
Color	:	Colorless
Odor	:	None.
Odor threshold	:	No data available
pH	:	7
Melting point	:	0 °C
Freezing point	:	No data available
Boiling point	:	100 °C
Critical temperature	:	374.1 °C
Critical pressure	:	218.3 atm
Flash point	:	No data available
Relative evaporation rate (butyl acetate=1)	:	No data available
Flammability (solid, gas)	:	Non flammable.
Vapor pressure	:	17.535 mm Hg
Vapor pressure at 50 °C	:	92.51 mm Hg
Relative vapor density at 20 °C	:	No data available
Relative density	:	1
Specific gravity / density	:	0.99823 g/ml
Molecular mass	:	18 g/mol
Solubility	:	Soluble in acetic acid. Soluble in acetone. Soluble in ammonia. Soluble in ammonium chloride. Soluble in ethanol. Soluble in glycerol. Soluble in hydrochloric acid. Soluble in methanol. Soluble in nitric acid. Soluble in sulfuric acid. Soluble in sodium hydroxide solution. Soluble in propylene glycol.
Log Pow	:	No data available
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity, kinematic	:	1.004 cSt
Viscosity, dynamic	:	1.002 cP
Explosion limits	:	No data available
Explosive properties	:	Not applicable.
Oxidizing properties	:	None.

9.2. Other information

VOC content : 0 %

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Not established.

10.4. Conditions to avoid

Extremely high or low temperatures.

10.5. Incompatible materials

Metallic sodium.

10.6. Hazardous decomposition products

Hydrogen. oxygen.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Likely routes of exposure : Skin and eye contact

Acute toxicity : Not classified

Water (7732-18-5)	
LD50 oral rat	≥ 90000 mg/kg
ATE US (oral)	90000 mg/kg body weight

Skin corrosion/irritation : Not classified
pH: 7

Serious eye damage/irritation : Not classified
pH: 7

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified
(Based on available data, the classification criteria are not met)

Reproductive toxicity : Not classified

Specific target organ toxicity – single exposure : Not classified

Specific target organ toxicity – repeated exposure : Not classified

Aspiration hazard : Not classified

Potential Adverse human health effects and symptoms : Based on available data, the classification criteria are not met.

SECTION 12: Ecological information

12.1. Toxicity

No additional information available

12.2. Persistence and degradability

Water (7732-18-5)	
Persistence and degradability	Not established.

12.3. Bioaccumulative potential

Water (7732-18-5)	
Bioaccumulative potential	Not established.

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Other information : No other effects known.

SECTION 13: Disposal considerations

13.1. Disposal methods

Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Not regulated

SECTION 15: Regulatory information

15.1. US Federal regulations

Water (7732-18-5)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

15.2. International regulations

CANADA

No additional information available

EU-Regulations

No additional information available

National regulations

No additional information available

15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

SECTION 16: Other information

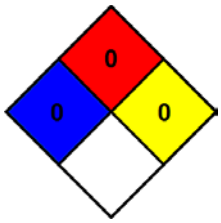
Revision date : 06/12/2018

Other information : None.

NFPA health hazard : 0 - Materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials.

NFPA fire hazard : 0 - Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.

NFPA reactivity : 0 - Material that in themselves are normally stable, even under fire conditions.



Hazard Rating

Health : 0 Minimal Hazard - No significant risk to health

Flammability : 0 Minimal Hazard - Materials that will not burn

Physical : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

Personal protection : A

A - Safety glasses

SDS US LabChem

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SAFETY DATA SHEET

CITGO No. 2 Diesel Fuel, Low Sulfur, All Grades

Section 1. Identification

GHS product identifier : CITGO No. 2 Diesel Fuel, Low Sulfur, All Grades

Chemical name : Fuels, diesel, No 2

Synonyms : No. 2-D Grade Diesel Fuel Oil (defined by ASTM D-975); Treated or Refined Diesel Fuel No. 2; Grade 2 Distillate Fuel; Hydrodesulfurized Middle Distillate; C9-C16 Petroleum Hydrocarbons

Code : Various

MSDS # : AG2DF

Supplier's details : CITGO Petroleum Corporation
P.O. Box 4689
Houston, TX 77210
sdsvend@citgo.com

Emergency telephone number : Technical Contact: (832) 486-4000
Medical Emergency: (832) 486-4700
CHEMTREC Emergency: (800) 424-9300
(United States Only)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 3
ACUTE TOXICITY: INHALATION - Category 4
SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2B
CARCINOGENICITY - Category 2
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) [central nervous system (CNS)] - Category 2
ASPIRATION HAZARD - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Flammable liquid and vapor.
Harmful if inhaled.
Causes skin and eye irritation.
Suspected of causing cancer.
May be fatal if swallowed and enters airways.
May cause damage to organs through prolonged or repeated exposure. (central nervous system (CNS))

Precautionary statements

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Do not breathe vapor. Wash hands thoroughly after handling.

Section 2. Hazards identification

Response : Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. If skin irritation occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up. Store in a well-ventilated place. Keep cool.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : Fuels, diesel, No 2

Other means of identification : No. 2-D Grade Diesel Fuel Oil (defined by ASTM D-975); Treated or Refined Diesel Fuel No. 2; Grade 2 Distillate Fuel; Hydrodesulfurized Middle Distillate; C9-C16 Petroleum Hydrocarbons

CAS number/other identifiers

CAS number : 68476-34-6

Ingredient name	%	CAS number
Ethyltoluene	<3	25550-14-5
Trimethylbenzene, all isomers	<2	25551-13-7
Naphthalene	<2	91-20-3
Biphenyl	<2	92-52-4
Cumene	<1	98-82-8
Xylenes, mixed isomers	<1	1330-20-7
Ethylbenzene	<1	100-41-4

* = Various ** = Mixture *** = Proprietary

Any concentration shown as a range is to protect confidentiality or is due to process variation.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that gas or vapor is still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Wash contaminated skin with soap and water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Section 4. First aid measures

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute

Potential acute health effects

Eye contact : Causes eye irritation.

Inhalation : Harmful if inhaled. Long-term exposure to diesel engine exhaust may cause cancer.

Skin contact : Causes skin irritation.

Ingestion : May be fatal if swallowed and enters airways. Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : Adverse symptoms may include the following:
nausea or vomiting

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : If ingested, this material presents a significant aspiration and chemical pneumonitis hazard. Induction of emesis is not recommended. Consider activated charcoal and/or gastric lavage. If patient is obtunded, protect the airway by cuffed endotracheal intubation or by placement of the body in a Trendelenburg and left lateral decubitus position.

Specific treatments : Treat symptomatically and supportively.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that gas or vapor is still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Specific hazards arising from the chemical : Flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Extinguishing media

Suitable extinguishing media : Use dry chemical, carbon dioxide (CO_2,) water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

Section 5. Fire-fighting measures

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
Diesel engine exhaust

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not swallow. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container. Non equilibrium conditions may increase the fire hazard associated with this product. Always bond receiving containers to the fill pipe before and during loading. Always confirm that receiving container is properly grounded. Bonding and grounding alone

Section 7. Handling and storage

may be inadequate to eliminate fire and explosion hazards. Carefully review operations that may increase the risks such as tank and container filling, tank cleaning, sampling, gauging, loading, filtering, mixing, agitation, etc. In addition to bonding and grounding, efforts to mitigate the hazards may include, but are not limited to, ventilation, inerting and/or reduction of transfer velocities.
Always keep nozzle in contact with the container throughout the loading process. Do NOT fill any portable container in or on a vehicle.

Special precautions, such as reduced loading rates and increased monitoring, must be observed during "switch loading" operations (i.e., loading this material in tanks or shipping compartments that previously contained a dissimilar product).

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Bulk Storage Conditions: Maintain all storage tanks in accordance with applicable regulations. Use necessary controls to monitor tank inventories. Inspect all storage tanks on a periodic basis. Test tanks and associated piping for tightness. Maintain the automatic leak detection devices to assure proper working condition.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Trimethylbenzene, all isomers	**ACGIH TLV (United States, 4/2014).** TWA: 25 ppm 8 hours. TWA: 123 mg/m³ 8 hours.
Naphthalene	**ACGIH (United States). Absorbed through skin.** TWA: 10 ppm 8 hours. STEL: 15 ppm 15 minutes. **OSHA (United States).** TWA: 10 ppm 8 hours. **ACGIH TLV (United States, 4/2014). Absorbed through skin.** TWA: 10 ppm 8 hours. TWA: 52 mg/m³ 8 hours. **OSHA PEL (United States, 2/2013).** TWA: 10 ppm 8 hours. TWA: 50 mg/m³ 8 hours.
Biphenyl	**OSHA PEL Z2 (United States).** TWA: 0.2 ppm 8 hours. **ACGIH TLV (United States, 4/2014).** TWA: 0.2 ppm 8 hours. TWA: 1.3 mg/m³ 8 hours. **OSHA PEL (United States, 2/2013).** TWA: 0.2 ppm 8 hours. TWA: 1 mg/m³ 8 hours.
Cumene	**ACGIH TLV (United States, 4/2014).** TWA: 50 ppm 8 hours. **OSHA PEL (United States, 2/2013). Absorbed through**

Section 8. Exposure controls/personal protection

	skin. TWA: 50 ppm 8 hours. TWA: 245 mg/m³ 8 hours.
Xylenes, mixed isomers	**ACGIH TLV (United States, 4/2014).** TWA: 100 ppm 8 hours. TWA: 434 mg/m³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 651 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.
Ethylbenzene	**ACGIH TLV (United States, 4/2014).** TWA: 20 ppm 8 hours. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, vapor controls, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: Splash goggles. Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. chemical splash goggles. If inhalation hazards exist, a full-face respirator may be required instead.

Skin protection

Hand protection : Chemical-resistant gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or supplied-air respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Physical state	:	Liquid.
Color	:	Colorless to light yellow or red.
Odor	:	Characteristic.
pH	:	Not available.
Melting point	:	-30 to -18°C (-22 to -0.4°F)
Boiling point/boiling range	:	282 to 338°C (539.6 to 640.4°F)
Flash point	:	Closed cup: 52°C (125.6°F) [Pensky-Martens.]
Evaporation rate	:	<1 (butyl acetate = 1)
Lower and upper explosive (flammable) limits	:	Lower: 0.6% Upper: 6.5%
Vapor pressure	:	0.27 kPa (2 mm Hg) [room temperature]
Vapor density	:	5 [Air = 1]
Relative density	:	0.84
Density lbs/gal	:	Estimated 7 lbs/gal
Gravity, °API	:	Estimated 37 @ 60 F
Solubility	:	Very slightly soluble in the following materials: cold water.
Solubility in water	:	0.005 g/l
Partition coefficient: n-octanol/water	:	>3.3
Auto-ignition temperature	:	254 to 285°C (489.2 to 545°F)
Viscosity	:	Kinematic (room temperature): 0.03 cm^2/s (3 cSt)

Section 10. Stability and reactivity

Reactivity	:	Not expected to be Explosive, Self-Reactive, Self-Heating, or an Organic Peroxide under US GHS Definition(s).
Chemical stability	:	The product is stable.
Possibility of hazardous reactions	:	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	:	Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.
Incompatible materials	:	Reactive or incompatible with the following materials: oxidizing materials
Hazardous decomposition products	:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Section 11. Toxicological information

Product/ingredient name	Result	Species	Dose	Exposure
Trimethylbenzene, all isomers	LD50 Oral	Rat	8970 mg/kg	-
Naphthalene	LD50 Oral	Rat	490 mg/kg	-
Biphenyl	LD50 Dermal	Rabbit	>5010 mg/kg	-
	LD50 Oral	Rat	2140 mg/kg	-
Cumene	LC50 Inhalation Vapor	Mouse	10 g/m³	7 hours
	LD50 Dermal	Rabbit	12300 uL/kg	-
	LD50 Oral	Rat	2.9 g/kg	-
	LD50 Oral	Rat	4000 mg/kg	-
Xylenes, mixed isomers	LC50 Inhalation Gas.	Cat	9500 ppm	2 hours
	LC50 Inhalation Gas.	Rat	5000 ppm	4 hours
	LC50 Inhalation Gas.	Rat	6700 ppm	4 hours
	LC50 Inhalation Gas.	Rat	6670 ppm	4 hours
	LD50 Oral	Mouse	2119 mg/kg	-
	LD50 Oral	Rat	4300 mg/kg	-
	LD50 Oral	Rat	4300 mg/kg	-
Ethylbenzene	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	3500 mg/kg	-

Conclusion/Summary : No additional information.

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Trimethylbenzene, all isomers	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 milligrams	-
Naphthalene	Skin - Mild irritant	Rabbit	-	495 milligrams	-
Biphenyl	Eyes - Mild irritant	Rabbit	-	100 milligrams	-
	Skin - Severe irritant	Rabbit	-	24 hours 500 microliters	-
Cumene	Eyes - Mild irritant	Rabbit	-	86 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 10 milligrams	-
Xylenes, mixed isomers	Skin - Mild irritant	Rat	-	8 hours 60 microliters	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	100 Percent	-
Ethylbenzene	Skin - Mild irritant	Rabbit	-	24 hours 15 milligrams	-

Skin : No additional information.

Eyes : No additional information.

Respiratory : No additional information.

Sensitization

Skin : No additional information.

Respiratory : No additional information.

Mutagenicity

Conclusion/Summary : No additional information.

Carcinogenicity

Conclusion/Summary :

Section 11. Toxicological information

Diesel exhaust particulate: Lung tumor and lymphomas were identified in rats and mice exposed to unflitered diesel fuel exhaust in chronic inhalation studies. Further, epidemiological studies have identified increase incidences of lung cancer in US railroad workers and bladder cancer in bus and truck drivers possibly associated with exposure to diesel engine exhaust. NTP has determined that exposure to diesel exhaust particulates, a complex mixture of combustion products of diesel fuel, is reasonably anticipated to be a human carcinogen. In addition, NIOSH has identified complete diesel exhaust as a potential carcinogen.

Classification

Product/ingredient name	OSHA	IARC	NTP
Fuels, diesel, No 2	-	3	-
Diesel exhaust particulate	-	1	Reasonably anticipated to be a human carcinogen.
Naphthalene	-	2B	Reasonably anticipated to be a human carcinogen.
Cumene	-	2B	Reasonably anticipated to be a human carcinogen.
Xylenes, mixed isomers	-	3	-
Ethylbenzene	-	2B	-

Reproductive toxicity

Conclusion/Summary : No additional information.

Teratogenicity

Conclusion/Summary : No additional information.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Trimethylbenzene, all isomers	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Biphenyl	Category 3	Not applicable.	Respiratory tract irritation
Cumene	Category 3	Not applicable.	Respiratory tract irritation
Ethylbenzene	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Fuels, diesel, No 2	Category 2	Not determined	central nervous system (CNS)
Trimethylbenzene, all isomers	Category 2	Not determined	central nervous system (CNS)
Xylenes, mixed isomers	Category 2	Not determined	ears

Aspiration hazard

Name	Result
Trimethylbenzene, all isomers	ASPIRATION HAZARD - Category 1
Cumene	ASPIRATION HAZARD - Category 1
Ethylbenzene	ASPIRATION HAZARD - Category 1
propylbenzene	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Routes of entry anticipated: Dermal, Inhalation.

Potential acute health effects

Eye contact : Causes eye irritation.

Inhalation : Harmful if inhaled. Long-term exposure to diesel engine exhaust may cause cancer.

Skin contact : Causes skin irritation.

Section 11. Toxicological information

Ingestion : May be fatal if swallowed and enters airways. Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : Adverse symptoms may include the following:
nausea or vomiting

Potential chronic health effects

General : May cause damage to organs through prolonged or repeated exposure.

Carcinogenicity : Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Trimethylbenzene, all isomers	Acute LC50 5600 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
Naphthalene	Acute EC50 1600 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 2350 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 213 µg/l Fresh water	Fish - Melanotaenia fluviatilis - Larvae	96 hours
	Chronic NOEC 0.67 ppm Fresh water	Fish - Oncorhynchus kisutch	40 days
Biphenyl	Acute LC50 360 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 1450 µg/l Fresh water	Fish - Pimephales promelas	96 hours
	Chronic NOEC 0.17 mg/l Fresh water	Daphnia - Daphnia magna - Neonate	21 days
	Chronic NOEC 0.229 mg/l Fresh water	Fish - Oncorhynchus mykiss	87 days
Cumene	Acute EC50 2600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 7400 µg/l Fresh water	Crustaceans - Artemia sp. - Nauplii	48 hours
	Acute EC50 10600 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 2700 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours
Xylenes, mixed isomers	Acute EC50 90 mg/l Fresh water	Crustaceans - Cypris subglobosa	48 hours
	Acute LC50 8.5 ppm Marine water	Crustaceans - Palaemonetes pugio - Adult	48 hours
	Acute LC50 8500 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 15700 µg/l Fresh water	Fish - Lepomis macrochirus -	96 hours

Section 12. Ecological information

		Juvenile (Fledgling, Hatchling, Weanling)	
	Acute LC50 19000 µg/l Fresh water	Fish - Lepomis macrochirus	96 hours
	Acute LC50 13400 µg/l Fresh water	Fish - Pimephales promelas	96 hours
	Acute LC50 16940 µg/l Fresh water	Fish - Carassius auratus	96 hours
Ethylbenzene	Acute EC50 4600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 3600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Acute EC50 2930 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 5200 µg/l Marine water	Crustaceans - Americamysis bahia	48 hours
	Acute LC50 4200 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours
	Chronic NOEC 1000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours

Conclusion/Summary : Not available.

Persistence and degradability

Not available.

Conclusion/Summary : Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Fuels, diesel, No 2	>3.3	-	low
Trimethylbenzene, all isomers	3.4 to 3.8	-	low
Naphthalene	3.4	36.5 to 168	low
Biphenyl	4.008	1900	high
Cumene	3.55	94.69	low
Xylenes, mixed isomers	3.12	8.1 to 25.9	low
Ethylbenzene	3.6	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

RCRA classification : D001, D018

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	NA1993	UN 1202	UN 1202
UN proper shipping name	NA 1993, Diesel Fuel, 3, PG III	UN 1202, Diesel Fuel, 3, PG III	UN 1202, Diesel Fuel, 3, PG III
Transport hazard class(es)	3	3	3
Packing group	III	III	III
Environmental hazards	No.	Yes.	No.
Additional information	**Packaging instruction** **Passenger aircraft** Quantity limitation: 60 L Packaging instructions: Y309 **Cargo aircraft** Quantity limitation: 220 L Packaging instructions: 310 **Remarks** 49 CFR 173.150 (f)(1) states that a flammable liquid with a flash point at or above 38ºC (100ºF) that does not meet the definition of any other hazard class may be reclassed as a combustible liquid. This provision does not apply to transportation by vessel or aircraft except where other means of transportaion is impracticable.	-	**Cargo Aircraft Only**Quantity limitation: 220 L Packaging instructions: 310 **Limited Quantities - Passenger Aircraft**Quantity limitation: 60 L Packaging instructions: 309Y

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 15. Regulatory information

U.S. Federal regulations : **United States inventory (TSCA 8b)**: All components are listed or exempted.

Clean Water Act (CWA) 307: Ethylbenzene; Naphthalene; Toluene; Benzene

Clean Water Act (CWA) 311: Ethylbenzene; Xylenes, mixed isomers; Naphthalene; Toluene; Benzene

This material is classified as an oil under Section 311 of the Clean Water Act (CWA) and the Oil Pollution Act of 1990 (OPA). Discharges or spills which produce a visible sheen on waters of the United States, their adjoining shorelines, or into conduits leading to surface waters must be reported to the EPA's National Response Center at (800) 424-8802.

Section 15. Regulatory information

SARA 302/304

Composition/information on ingredients

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Name	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Fuels, diesel, No 2	Yes.	No.	No.	Yes.	Yes.
Trimethylbenzene, all isomers	Yes.	No.	No.	Yes.	Yes.
Naphthalene	Yes.	No.	No.	Yes.	Yes.
Biphenyl	No.	No.	No.	Yes.	No.
Cumene	Yes.	No.	No.	Yes.	Yes.
Xylenes, mixed isomers	Yes.	No.	No.	Yes.	Yes.
Ethylbenzene	Yes.	No.	No.	Yes.	Yes.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	Naphthalene Ethylbenzene	91-20-3 100-41-4	<1 <1
Supplier notification	Naphthalene Ethylbenzene	91-20-3 100-41-4	<1 <1

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed: Trimethylbenzene, all isomers; Ethyltoluene

New York : The following components are listed: Ethylbenzene; Cumene; Benzene, 1-methylethyl-; Naphthalene

New Jersey : The following components are listed: Ethylbenzene; Cumene; NAPHTHALENE; TRIMETHYL BENZENE (mixed isomers); BENZENE, TRIMETHYL-; ETHYLTOLUENES; BENZENE, ETHYLMETHYL-

Pennsylvania : The following components are listed: Ethylbenzene; Cumene; NAPHTHALENE; Trimethylbenzene, all isomers; Ethyltoluene

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.
WARNING: This product contains less than 1% of a chemical known to the State of California to cause birth defects or other reproductive harm.

Ingredient name	%	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
Naphthalene	<1	Yes.	No.	Yes.	No.
Cumene	<1	Yes.	No.	No.	No.
Ethylbenzene	<1	Yes.	No.	41 µg/day (ingestion) 54 µg/day (inhalation)	No.
Diesel exhaust particulate	<1	Yes.	No.	No.	No.
Toluene	<0.1	No.	Yes.	No.	7000 µg/day (ingestion)
Benzene	<0.1	Yes.	Yes.	6.4 µg/day (ingestion)	24 µg/day (ingestion) 49 µg/day

Section 15. Regulatory information

				13 µg/day (inhalation)	(inhalation)

International regulations

International lists : **Australia inventory (AICS)**: All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Japan inventory: All components are listed or exempted.
Korea inventory: All components are listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.
Philippines inventory (PICCS): All components are listed or exempted.
Taiwan inventory (CSNN): Not determined.

Canada inventory : All components are listed or exempted.

EU Inventory : All components are listed or exempted.

WHMIS (Canada) : Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-2A: Material causing other toxic effects (Very toxic).

Section 16. Other information

National Fire Protection Association (U.S.A.)

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of issue/Date of revision : 7/29/2015.

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Notice to reader

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Section 16. Other information

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Appendix E
CU01/ST02 - CO Control Option Supporting Data

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	11	125,000	323	28.01

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	160,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	157,000	acfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	15	Years	
Catalyst Data:			
Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	0	$/ft^3	
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	390.6	1999 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs				
Total Purchased equipment costs (in 2021 dollars)				
Incinerator + auxiliary equipment[a] (A) =				
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2021 CEPI/1999 CEPCI) =	1.158675799	$1,915,336	in 2021 dollars
Instrumentation[b] =	0.10 × A =		$191,534	
Sales taxes =	0.03 × A =		$57,460	
Freight =	0.05 × A =		$95,767	
		Total Purchased equipment costs (B) =	$2,260,097	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)				
Foundations and Supports =	0.08 × B =		$180,808	
Handlong and Errection =		8760	$316,414	
Electrical =	0.04 × B =		$90,404	
Piping =	0.02 × B =		$45,202	
Insulation for Ductwork =	0.01 × B =		$22,601	
Painting =	0.01 × B =		$22,601	
Site Preparation (SP) =			$0	
Buildings (Bldg) =			$0	
		95	$678,029	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =		$2,938,126	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)				
Engineering =	0.10 × B =		$226,010	
Construction and field expenses =	0.05 × B =		$113,005	
Contractor fees =	0.10 × B =		$226,010	
Start-up =	0.02 × B =		$45,202	
Performance test =	0.01 × B =		$22,601	
		Total Indirect Costs (IC) =	$632,827	
		686.7		
Continency Cost (C) =	CF(IC+DC)=		$357,095	
Total Capital Investment =		**0.0786**	**$3,928,048**	**in 2021 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/ft^3 cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$0	
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$484,829	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$3,488,426	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$4,022,776**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$78,561	
Property Taxes	= 1% of TCI	$39,280	
Insurance	= 1% of TCI	$39,280	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$359,497	
Indirect Annual Costs (IC) =		**$546,331**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$4,569,108**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$4,569,108	per year in 2021 dollars
CO Destroyed =	30.7	tons/year
Cost Effectiveness =	$148,989	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	11	125,000	323	28.01

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	160,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	157,000	acfm	
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	15	Years	
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	541.7	2016 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs				
Total Purchased equipment costs (in 2021 dollars)				
Incinerator + auxiliary equipment[a] (A) =				
Equipment Costs (EC) for Regenerative Oxidizer	=[2.664 x 100,000 + (13.98 x Qtot)] x (2021 CEPI/2016 CEPCI) =	1.158675799	$3,178,798	in 2021 dollars
Instrumentation[b] =	0.10 × A =		$317,880	
Sales taxes =	0.03 × A =		$95,364	
Freight =	0.05 × A =		$158,940	
		Total Purchased equipment costs (B) =	$3,750,982	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)				
Foundations and Supports =	0.08 × B =		$300,079	
Handlong and Errection =		8760	$525,137	
Electrical =	0.04 × B =		$150,039	
Piping =	0.02 × B =		$75,020	
Insulation for Ductwork =	0.01 × B =		$37,510	
Painting =	0.01 × B =		$37,510	
Site Preparation (SP) =			$0	
Buildings (Bldg) =			$0	
		95	$1,125,295	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =		$4,876,276	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)				
Engineering =	0.10 × B =		$375,098	
Construction and field expenses =	0.05 × B =		$187,549	
Contractor fees =	0.10 × B =		$375,098	
Start-up =	0.02 × B =		$75,020	
Performance test =	0.01 × B =		$37,510	
		Total Indirect Costs (IC) =	$1,050,275	
		686.7		
Continency Cost (C) =	CF(IC+DC)=		$592,655	
Total Capital Investment =		**0.0786**	**$6,519,206**	**in 2021 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$400,511	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$1,004,410	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$1,454,443**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$130,384	
Property Taxes	= 1% of TCI	$65,192	
Insurance	= 1% of TCI	$65,192	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$596,641	
Indirect Annual Costs (IC) =		**$887,122**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$2,341,564**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$2,341,564	per year in 2021 dollars
CO Destroyed =	30.7	tons/year
Cost Effectiveness =	$76,354	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	11	125,000	323	28.01
VOC	1.2	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	160,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	157,000	acfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	15	Years	
Catalyst Data:			
Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	0	$/ft^3	
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	390.6	1999 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs				
Total Purchased equipment costs (in 2021 dollars)				
Incinerator + auxiliary equipment[a] (A) =				
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2021 CEPI/1999 CEPCI) =	1.158675799	$1,915,333	in 2021 dollars
Instrumentation[b] =	0.10 × A =		$191,533	
Sales taxes =	0.03 × A =		$57,460	
Freight =	0.05 × A =		$95,767	
		Total Purchased equipment costs (B) =	$2,260,093	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)				
Foundations and Supports =	0.08 × B =		$180,807	
Handlong and Errection =		8760	$316,413	
Electrical =	0.04 × B =		$90,404	
Piping =	0.02 × B =		$45,202	
Insulation for Ductwork =	0.01 × B =		$22,601	
Painting =	0.01 × B =		$22,601	
Site Preparation (SP) =			$0	
Buildings (Bldg) =			$0	
		95	$678,028	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =		$2,938,121	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)				
Engineering =	0.10 × B =		$226,009	
Construction and field expenses =	0.05 × B =		$113,005	
Contractor fees =	0.10 × B =		$226,009	
Start-up =	0.02 × B =		$45,202	
Performance test =	0.01 × B =		$22,601	
		Total Indirect Costs (IC) =	$632,826	
		686.7		
Continency Cost (C) =	CF(IC+DC)=		$357,095	
Total Capital Investment =		**0.0786**	**$3,928,041**	**in 2021 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/ft^3 cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$0	
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$484,829	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$3,486,815	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$4,021,165**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$78,561	
Property Taxes	= 1% of TCI	$39,280	
Insurance	= 1% of TCI	$39,280	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$359,496	
Indirect Annual Costs (IC) =		**$546,330**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$4,567,496**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$4,567,496	per year in 2021 dollars
CO/VOC Destroyed =	35.9	tons/year
Cost Effectiveness =	$127,061	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	11	125,000	323	28.01
VOC	1.2	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	160,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	157,000	acfm	
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	15	Years	
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	541.7	2016 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs				
Total Purchased equipment costs (in 2021 dollars)				
Incinerator + auxiliary equipment[a] (A) =				
Equipment Costs (EC) for Regenerative Oxidizer	=[2.664 x 100,000 + (13.98 x Qtot)] x (2021 CEPI/2016 CEPCI) =	1.158675799	$3,178,798	in 2021 dollars
Instrumentation[b] =	0.10 × A =		$317,880	
Sales taxes =	0.03 × A =		$95,364	
Freight =	0.05 × A =		$158,940	
		Total Purchased equipment costs (B) =	$3,750,982	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)				
Foundations and Supports =	0.08 × B =		$300,079	
Handlong and Errection =		8760	$525,137	
Electrical =	0.04 × B =		$150,039	
Piping =	0.02 × B =		$75,020	
Insulation for Ductwork =	0.01 × B =		$37,510	
Painting =	0.01 × B =		$37,510	
Site Preparation (SP) =			$0	
Buildings (Bldg) =			$0	
		95	$1,125,295	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =		$4,876,276	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)				
Engineering =	0.10 × B =		$375,098	
Construction and field expenses =	0.05 × B =		$187,549	
Contractor fees =	0.10 × B =		$375,098	
Start-up =	0.02 × B =		$75,020	
Performance test =	0.01 × B =		$37,510	
		Total Indirect Costs (IC) =	$1,050,275	
		686.7		
Continency Cost (C) =	CF(IC+DC)=		$592,655	
Total Capital Investment =		**0.0786**	**$6,519,206**	**in 2021 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$400,511	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$1,004,410	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$1,454,443**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$130,384	
Property Taxes	= 1% of TCI	$65,192	
Insurance	= 1% of TCI	$65,192	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$596,641	
Indirect Annual Costs (IC) =		**$887,122**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$2,341,564**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$2,341,564	per year in 2021 dollars
CO/VOC Destroyed =	35.9	tons/year
Cost Effectiveness =	$65,139	per ton of pollutants removed in 2021 dollars

Appendix F
CU06/ST07 - CO Control Option Supporting Data

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	23	125,000	323	28.01

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	105,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	110,000	acfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Catalyst Data:			
Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	0	$/ft^3	
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	390.6	1999 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2021 CEPI/1999 CEPCI) =	$1,517,533	in 2021 dollars
Instrumentation[b] =	0.10 × A =	$151,753	
Sales taxes =	0.03 × A =	$45,526	
Freight =	0.05 × A =	$75,877	
	Total Purchased equipment costs (B) =	$1,790,689	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$143,255	
Handlong and Errection =	0.14 × B =	$250,696	
Electrical =	0.04 × B =	$71,628	
Piping =	0.02 × B =	$35,814	
Insulation for Ductwork =	0.01 × B =	$17,907	
Painting =	0.01 × B =	$17,907	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$537,207	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$2,327,896	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$179,069	
Construction and field expenses =	0.05 × B =	$89,534	
Contractor fees =	0.10 × B =	$179,069	
Start-up =	0.02 × B =	$35,814	
Performance test =	0.01 × B =	$17,907	
	Total Indirect Costs (IC) =	$501,393	
Continency Cost (C) =	CF(IC+DC)=	$282,929	
Total Capital Investment =	**DC + IC +C =**	**$3,112,217**	**in 2021 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/ft^3 cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$0	
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$339,689	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,287,716	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$2,676,927**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$62,244	
Property Taxes	= 1% of TCI	$31,122	
Insurance	= 1% of TCI	$31,122	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$234,100	
Indirect Annual Costs (IC) =		**$388,302**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$3,065,229**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,065,229	per year in 2021 dollars
CO/VOC Destroyed =	43.8	tons/year
Cost Effectiveness =	$69,927	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	23	125,000	323	28.01

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	105,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	110,000	acfm	
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	541.7	2016 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=[2.664 x 100,000 + (13.98 x Qtot)] x (2021 CEPI/2016 CEPCI) =	$2,202,174	in 2021 dollars
Instrumentation[b] =	0.10 × A =	$220,217	
Sales taxes =	0.03 × A =	$66,065	
Freight =	0.05 × A =	$110,109	
	Total Purchased equipment costs (B) =	$2,598,565	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$207,885	
Handlong and Errection =	0.14 × B =	$363,799	
Electrical =	0.04 × B =	$103,943	
Piping =	0.02 × B =	$51,971	
Insulation for Ductwork =	0.01 × B =	$25,986	
Painting =	0.01 × B =	$25,986	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$779,569	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$3,378,134	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$259,856	
Construction and field expenses =	0.05 × B =	$129,928	
Contractor fees =	0.10 × B =	$259,856	
Start-up =	0.02 × B =	$51,971	
Performance test =	0.01 × B =	$25,986	
	Total Indirect Costs (IC) =	$727,598	
Continency Cost (C) =	CF(IC+DC)=	$410,573	
Total Capital Investment =	**DC + IC +C =**	**$4,516,306**	**in 2021 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$280,613	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$659,151	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$989,286**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$90,326	
Property Taxes	= 1% of TCI	$45,163	
Insurance	= 1% of TCI	$45,163	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$339,716	
Indirect Annual Costs (IC) =		**$550,081**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$1,539,366**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,539,366	per year in 2021 dollars
CO/VOC Destroyed =	43.8	tons/year
Cost Effectiveness =	$35,118	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	23	125,000	323	28.01
VOC	8	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	105,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	110,000	acfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Catalyst Data:			
Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	0	$/ft^3	
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	390.6	1999 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs				
Total Purchased equipment costs (in 2021 dollars)				
Incinerator + auxiliary equipment[a] (A) =				
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2021 CEPI/1999 CEPCI) =		$1,517,515	in 2021 dollars
VOC		7.970890411	21000	2353
Instrumentation[b] =	0.10 × A =		$151,752	
Sales taxes =	0.03 × A =		$45,525	
Freight =	0.05 × A =		$75,876	
	Total Purchased equipment costs (B) =		$1,790,668	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$143,253	
Handlong and Errection =	0.14 × B =	$250,694	
Electrical =	0.04 × B =	$71,627	
Piping =	0.02 × B =	$35,813	
Insulation for Ductwork =	0.01 × B =	$17,907	
Painting =	0.01 × B =	$17,907	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$537,200	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$2,327,869	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$179,067	
Construction and field expenses =	0.05 × B =	$89,533	
Contractor fees =	0.10 × B =	$179,067	
Start-up =	0.02 × B =	$35,813	
Performance test =	0.01 × B =	$17,907	
	Total Indirect Costs (IC) =	$501,387	
Continency Cost (C) =	CF(IC+DC)=	$282,926	
Total Capital Investment =	**DC + IC +C =**	**$3,112,181**	**in 2021 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/ft^3 cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$0	
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$339,689	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,280,621	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$2,669,832**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$62,244	
Property Taxes	= 1% of TCI	$31,122	
Insurance	= 1% of TCI	$31,122	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$234,098	
Indirect Annual Costs (IC) =		**$388,298**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$3,058,130**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,058,130	per year in 2021 dollars
CO/VOC Destroyed =	67.2	tons/year
Cost Effectiveness =	$45,479	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	23	125,000	323	28.01
VOC	8	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	105,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	110,000	acfm	
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	541.7	2016 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=[2.664 x 100,000 + (13.98 x Qtot)] x (2021 CEPI/2016 CEPCI) =	$2,202,174	in 2021 dollars
Instrumentation[b] =	0.10 × A =	$220,217	
Sales taxes =	0.03 × A =	$66,065	
Freight =	0.05 × A =	$110,109	
	Total Purchased equipment costs (B) =	$2,598,565	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$207,885	
Handlong and Errection =	0.14 × B =	$363,799	
Electrical =	0.04 × B =	$103,943	
Piping =	0.02 × B =	$51,971	
Insulation for Ductwork =	0.01 × B =	$25,986	
Painting =	0.01 × B =	$25,986	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$779,569	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$3,378,134	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$259,856	
Construction and field expenses =	0.05 × B =	$129,928	
Contractor fees =	0.10 × B =	$259,856	
Start-up =	0.02 × B =	$51,971	
Performance test =	0.01 × B =	$25,986	
	Total Indirect Costs (IC) =	$727,598	
Continency Cost (C) =	CF(IC+DC)=	$410,573	
Total Capital Investment =	**DC + IC +C =**	**$4,516,306**	**in 2021 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$280,613	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$659,151	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$989,286**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$90,326	
Property Taxes	= 1% of TCI	$45,163	
Insurance	= 1% of TCI	$45,163	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$339,716	
Indirect Annual Costs (IC) =		**$550,081**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$1,539,367**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,539,367	per year in 2021 dollars
CO/VOC Destroyed =	67.2	tons/year
Cost Effectiveness =	$22,893	per ton of pollutants removed in 2021 dollars

Appendix G
CU08/ST09 - CO Control Option Supporting Data

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	95	125,000	323	28.01

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	115,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	120,000	acfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Catalyst Data:			
Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	0	$/ft^3	
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	390.6	1999 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2021 CEPI/1999 CEPCI) =	$1,595,762	in 2021 dollars
Instrumentation[b] =	0.10 × A =	$159,576	
Sales taxes =	0.03 × A =	$47,873	
Freight =	0.05 × A =	$79,788	
	Total Purchased equipment costs (B) =	$1,882,999	in 2021 dollars
Footnotes			
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.			
b - Includes the instrumentation and controls furnished by the incinerator vendor.			
Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$150,640	
Handlong and Errection =	0.14 × B =	$263,620	
Electrical =	0.04 × B =	$75,320	
Piping =	0.02 × B =	$37,660	
Insulation for Ductwork =	0.01 × B =	$18,830	
Painting =	0.01 × B =	$18,830	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$564,900	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$2,447,899	in 2021 dollars
Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$188,300	
Construction and field expenses =	0.05 × B =	$94,150	
Contractor fees =	0.10 × B =	$188,300	
Start-up =	0.02 × B =	$37,660	
Performance test =	0.01 × B =	$18,830	
	Total Indirect Costs (IC) =	$527,240	
Continency Cost (C) =	CF(IC+DC)=	$297,514	
Total Capital Investment =	**DC + IC +C =**	**$3,272,652**	**in 2021 dollars**
Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/ft^3 cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$0	
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$370,570	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,495,681	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$2,915,772**	**in 2021 dollars**
Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$65,453	
Property Taxes	= 1% of TCI	$32,727	
Insurance	= 1% of TCI	$32,727	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$246,168	
Indirect Annual Costs (IC) =		**$406,787**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$3,322,560**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,322,560	per year in 2021 dollars
CO Destroyed =	198.4	tons/year
Cost Effectiveness =	$16,750	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	95	125,000	323	28.01

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	115,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	120,000	acfm	
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	541.7	2016 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=[2.664 x 100,000 + (13.98 x Qtot)] x (2021 CEPI/2016 CEPCI) =	$2,379,742	in 2021 dollars
Instrumentation[b] =	0.10 × A =	$237,974	
Sales taxes =	0.03 × A =	$71,392	
Freight =	0.05 × A =	$118,987	
	Total Purchased equipment costs (B) =	$2,808,095	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$224,648	
Handlong and Errection =	0.14 × B =	$393,133	
Electrical =	0.04 × B =	$112,324	
Piping =	0.02 × B =	$56,162	
Insulation for Ductwork =	0.01 × B =	$28,081	
Painting =	0.01 × B =	$28,081	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$842,429	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$3,650,524	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$280,810	
Construction and field expenses =	0.05 × B =	$140,405	
Contractor fees =	0.10 × B =	$280,810	
Start-up =	0.02 × B =	$56,162	
Performance test =	0.01 × B =	$28,081	
	Total Indirect Costs (IC) =	$786,267	
Continency Cost (C) =	CF(IC+DC)=	$443,679	
Total Capital Investment =	**DC + IC +C =**	**$4,880,470**	**in 2021 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$306,123	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$721,925	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$1,077,570**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$97,609	
Property Taxes	= 1% of TCI	$48,805	
Insurance	= 1% of TCI	$48,805	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$367,108	
Indirect Annual Costs (IC) =		**$592,040**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$1,669,610**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,669,610	per year in 2021 dollars
CO Destroyed =	198.4	tons/year
Cost Effectiveness =	$8,417	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	95	125,000	323	28.01
VOC	8	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	115,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	120,000	acfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Catalyst Data:			
Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	0	$/ft^3	
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	390.6	1999 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2021 CEPI/1999 CEPCI) =	$1,595,744	in 2021 dollars
Instrumentation[b] =	0.10 × A =	$159,574	
Sales taxes =	0.03 × A =	$47,872	
Freight =	0.05 × A =	$79,787	
	Total Purchased equipment costs (B) =	$1,882,978	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$150,638	
Handlong and Errection =	0.14 × B =	$263,617	
Electrical =	0.04 × B =	$75,319	
Piping =	0.02 × B =	$37,660	
Insulation for Ductwork =	0.01 × B =	$18,830	
Painting =	0.01 × B =	$18,830	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$564,893	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$2,447,871	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$188,298	
Construction and field expenses =	0.05 × B =	$94,149	
Contractor fees =	0.10 × B =	$188,298	
Start-up =	0.02 × B =	$37,660	
Performance test =	0.01 × B =	$18,830	
	Total Indirect Costs (IC) =	$527,234	
Continency Cost (C) =	CF(IC+DC)=	$297,510	
Total Capital Investment =	**DC + IC +C =**	**$3,272,615**	**in 2021 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/ft^3 cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$0	
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$370,570	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,488,015	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$2,908,106**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$65,452	
Property Taxes	= 1% of TCI	$32,726	
Insurance	= 1% of TCI	$32,726	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$246,166	
Indirect Annual Costs (IC) =		**$406,783**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$3,314,889**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,314,889	per year in 2021 dollars
CO/VOC Destroyed =	223.5	tons/year
Cost Effectiveness =	$14,833	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	95	125,000	323	28.01
VOC	8	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	115,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	120,000	acfm	
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	541.7	2016 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=[2.664 x 100,000 + (13.98 x Qtot)] x (2021 CEPI/2016 CEPCI) =	$2,379,742	in 2021 dollars
	7.671232877		
Instrumentation[b] =	0.10 × A =	$237,974	
Sales taxes =	0.03 × A =	$71,392	
Freight =	0.05 × A =	$118,987	
	Total Purchased equipment costs (B) =	$2,808,095	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$224,648	
Handlong and Errection =	0.14 × B =	$393,133	
Electrical =	0.04 × B =	$112,324	
Piping =	0.02 × B =	$56,162	
Insulation for Ductwork =	0.01 × B =	$28,081	
Painting =	0.01 × B =	$28,081	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$842,429	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$3,650,524	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$280,810	
Construction and field expenses =	0.05 × B =	$140,405	
Contractor fees =	0.10 × B =	$280,810	
Start-up =	0.02 × B =	$56,162	
Performance test =	0.01 × B =	$28,081	
	Total Indirect Costs (IC) =	$786,267	
Continency Cost (C) =	CF(IC+DC)=	$443,679	
Total Capital Investment =	**DC + IC +C =**	**$4,880,470**	**in 2021 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$306,123	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$721,926	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$1,077,570**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$97,609	
Property Taxes	= 1% of TCI	$48,805	
Insurance	= 1% of TCI	$48,805	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$367,108	
Indirect Annual Costs (IC) =		**$592,040**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$1,669,610**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,669,610	per year in 2021 dollars
CO/VOC Pollutants Destroyed =	223.5	tons/year
Cost Effectiveness =	$7,471	per ton of pollutants removed in 2021 dollars

Appendix H
CU01/ST02 - VOC Control Option Supporting Data

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	11	125,000	323	28.01
VOC	1.2	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	160,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	157,000	acfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	15	Years	
Catalyst Data:			
Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	0	$/ft^3	
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	390.6	1999 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs				
Total Purchased equipment costs (in 2021 dollars)				
Incinerator + auxiliary equipment[a] (A) =				
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2021 CEPI/1999 CEPCI) =	1.158675799	$1,915,333	in 2021 dollars
Instrumentation[b] =	0.10 × A =		$191,533	
Sales taxes =	0.03 × A =		$57,460	
Freight =	0.05 × A =		$95,767	
		Total Purchased equipment costs (B) =	$2,260,093	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)				
Foundations and Supports =	0.08 × B =		$180,807	
Handlong and Errection =		8760	$316,413	
Electrical =	0.04 × B =		$90,404	
Piping =	0.02 × B =		$45,202	
Insulation for Ductwork =	0.01 × B =		$22,601	
Painting =	0.01 × B =		$22,601	
Site Preparation (SP) =			$0	
Buildings (Bldg) =			$0	
		95	$678,028	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =		$2,938,121	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)				
Engineering =	0.10 × B =		$226,009	
Construction and field expenses =	0.05 × B =		$113,005	
Contractor fees =	0.10 × B =		$226,009	
Start-up =	0.02 × B =		$45,202	
Performance test =	0.01 × B =		$22,601	
		Total Indirect Costs (IC) =	$632,826	
		686.7		
Continency Cost (C) =	CF(IC+DC)=		$357,095	
Total Capital Investment =		**0.0786**	**$3,928,041**	**in 2021 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/ft^3 cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$0	
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$484,829	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$3,486,815	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$4,021,165**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$78,561	
Property Taxes	= 1% of TCI	$39,280	
Insurance	= 1% of TCI	$39,280	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$359,496	
Indirect Annual Costs (IC) =		**$546,330**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$4,567,496**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$4,567,496	per year in 2021 dollars
CO/VOC Destroyed =	35.9	tons/year
Cost Effectiveness =	$127,061	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	11	125,000	323	28.01
VOC	1.2	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	160,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	157,000	acfm	
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	15	Years	
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	541.7	2016 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs				
Total Purchased equipment costs (in 2021 dollars)				
Incinerator + auxiliary equipment[a] (A) =				
Equipment Costs (EC) for Regenerative Oxidizer	=[2.664 x 100,000 + (13.98 x Qtot)] x (2021 CEPI/2016 CEPCI) =	1.158675799	$3,178,798	in 2021 dollars
Instrumentation[b] =	0.10 × A =		$317,880	
Sales taxes =	0.03 × A =		$95,364	
Freight =	0.05 × A =		$158,940	
		Total Purchased equipment costs (B) =	$3,750,982	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)				
Foundations and Supports =	0.08 × B =		$300,079	
Handlong and Errection =		8760	$525,137	
Electrical =	0.04 × B =		$150,039	
Piping =	0.02 × B =		$75,020	
Insulation for Ductwork =	0.01 × B =		$37,510	
Painting =	0.01 × B =		$37,510	
Site Preparation (SP) =			$0	
Buildings (Bldg) =			$0	
		95	$1,125,295	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =		$4,876,276	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)				
Engineering =	0.10 × B =		$375,098	
Construction and field expenses =	0.05 × B =		$187,549	
Contractor fees =	0.10 × B =		$375,098	
Start-up =	0.02 × B =		$75,020	
Performance test =	0.01 × B =		$37,510	
		Total Indirect Costs (IC) =	$1,050,275	
		686.7		
Continency Cost (C) =	CF(IC+DC)=		$592,655	
Total Capital Investment =		**0.0786**	**$6,519,206**	**in 2021 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$400,511	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$1,004,410	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$1,454,443**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$130,384	
Property Taxes	= 1% of TCI	$65,192	
Insurance	= 1% of TCI	$65,192	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$596,641	
Indirect Annual Costs (IC) =		**$887,122**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$2,341,564**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$2,341,564	per year in 2021 dollars
CO/VOC Destroyed =	35.9	tons/year
Cost Effectiveness =	$65,139	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	1.2	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	160,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	157,000	acfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	15	Years	
Catalyst Data:			
Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	0	$/ft^3	
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	390.6	1999 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs				
Total Purchased equipment costs (in 2021 dollars)				
Incinerator + auxiliary equipment[a] (A) =				
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2021 CEPI/1999 CEPCI) =		$1,915,337	in 2021 dollars
Instrumentation[b] =	0.10 × A =		$191,534	
Sales taxes =	0.03 × A =		$57,460	
Freight =	0.05 × A =		$95,767	
		Total Purchased equipment costs (B) =	$2,260,098	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)				
Foundations and Supports =	0.08 × B =		$180,808	
Handlong and Errection =		8760	$316,414	
Electrical =	0.04 × B =		$90,404	
Piping =	0.02 × B =		$45,202	
Insulation for Ductwork =	0.01 × B =		$22,601	
Painting =	0.01 × B =		$22,601	
Site Preparation (SP) =			$0	
Buildings (Bldg) =			$0	
		95	$678,029	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =		$2,938,127	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)				
Engineering =	0.10 × B =		$226,010	
Construction and field expenses =	0.05 × B =		$113,005	
Contractor fees =	0.10 × B =		$226,010	
Start-up =	0.02 × B =		$45,202	
Performance test =	0.01 × B =		$22,601	
		Total Indirect Costs (IC) =	$632,827	
		686.7		
Continency Cost (C) =	CF(IC+DC)=		$357,095	
Total Capital Investment =		**0.0786**	**$3,928,050**	**in 2021 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/ft^3 cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$0	
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$484,829	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$3,488,837	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$4,023,187**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$78,561	
Property Taxes	= 1% of TCI	$39,280	
Insurance	= 1% of TCI	$39,280	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$359,497	
Indirect Annual Costs (IC) =		**$546,332**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$4,569,519**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$4,569,519	per year in 2021 dollars
VOC Destroyed =	5.3	tons/year
Cost Effectiveness =	$865,464	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	1.2	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	160,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	157,000	acfm	
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	15	Years	
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	541.7	2016 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=[2.664 x 100,000 + (13.98 x Qtot)] x (2021 CEPI/2016 CEPCI) =	$3,178,798	in 2021 dollars
Instrumentation[b] =	0.10 × A =	$317,880	
Sales taxes =	0.03 × A =	$95,364	
Freight =	0.05 × A =	$158,940	
	Total Purchased equipment costs (B) =	$3,750,982	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)				
Foundations and Supports =	0.08 × B =		$300,079	
Handlong and Errection =		8760	$525,137	
Electrical =	0.04 × B =		$150,039	
Piping =	0.02 × B =		$75,020	
Insulation for Ductwork =	0.01 × B =		$37,510	
Painting =	0.01 × B =		$37,510	
Site Preparation (SP) =			$0	
Buildings (Bldg) =			$0	
		95	$1,125,295	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =		$4,876,276	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)				
Engineering =	0.10 × B =		$375,098	
Construction and field expenses =	0.05 × B =		$187,549	
Contractor fees =	0.10 × B =		$375,098	
Start-up =	0.02 × B =		$75,020	
Performance test =	0.01 × B =		$37,510	
		Total Indirect Costs (IC) =	$1,050,275	
		686.7		
Continency Cost (C) =	CF(IC+DC)=		$592,655	
Total Capital Investment =		**0.0786**	**$6,519,206**	**in 2021 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$400,511	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$1,004,410	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$1,454,443**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$130,384	
Property Taxes	= 1% of TCI	$65,192	
Insurance	= 1% of TCI	$65,192	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$596,641	
Indirect Annual Costs (IC) =		**$887,122**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$2,341,564**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$2,341,564	per year in 2021 dollars
VOC Destroyed =	5.3	tons/year
Cost Effectiveness =	$443,491	per ton of pollutants removed in 2021 dollars

Appendix I
CU06/ST07 - VOC Control Option Supporting Data

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	23	125,000	323	28.01
VOC	8	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	105,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	110,000	acfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Catalyst Data:			
Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	0	$/ft^3	
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	390.6	1999 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs				
Total Purchased equipment costs (in 2021 dollars)				
Incinerator + auxiliary equipment[a] (A) =				
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2021 CEPI/1999 CEPCI) =		$1,517,515	in 2021 dollars
VOC		7.970890411	21000	2353
Instrumentation[b] =	0.10 × A =		$151,752	
Sales taxes =	0.03 × A =		$45,525	
Freight =	0.05 × A =		$75,876	
	Total Purchased equipment costs (B) =		$1,790,668	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$143,253	
Handlong and Errection =	0.14 × B =	$250,694	
Electrical =	0.04 × B =	$71,627	
Piping =	0.02 × B =	$35,813	
Insulation for Ductwork =	0.01 × B =	$17,907	
Painting =	0.01 × B =	$17,907	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$537,200	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$2,327,869	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$179,067	
Construction and field expenses =	0.05 × B =	$89,533	
Contractor fees =	0.10 × B =	$179,067	
Start-up =	0.02 × B =	$35,813	
Performance test =	0.01 × B =	$17,907	
	Total Indirect Costs (IC) =	$501,387	
Continency Cost (C) =	CF(IC+DC)=	$282,926	
Total Capital Investment =	**DC + IC +C =**	**$3,112,181**	**in 2021 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/ft^3 cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$0	
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$339,689	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,280,621	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$2,669,832**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$62,244	
Property Taxes	= 1% of TCI	$31,122	
Insurance	= 1% of TCI	$31,122	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$234,098	
Indirect Annual Costs (IC) =		**$388,298**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$3,058,130**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,058,130	per year in 2021 dollars
CO/VOC Destroyed =	67.2	tons/year
Cost Effectiveness =	$45,479	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	23	125,000	323	28.01
VOC	8	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	105,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	110,000	acfm	
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	541.7	2016 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=[2.664 x 100,000 + (13.98 x Qtot)] x (2021 CEPI/2016 CEPCI) =	$2,202,174	in 2021 dollars
Instrumentation[b] =	0.10 × A =	$220,217	
Sales taxes =	0.03 × A =	$66,065	
Freight =	0.05 × A =	$110,109	
	Total Purchased equipment costs (B) =	$2,598,565	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$207,885	
Handlong and Errection =	0.14 × B =	$363,799	
Electrical =	0.04 × B =	$103,943	
Piping =	0.02 × B =	$51,971	
Insulation for Ductwork =	0.01 × B =	$25,986	
Painting =	0.01 × B =	$25,986	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$779,569	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$3,378,134	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$259,856	
Construction and field expenses =	0.05 × B =	$129,928	
Contractor fees =	0.10 × B =	$259,856	
Start-up =	0.02 × B =	$51,971	
Performance test =	0.01 × B =	$25,986	
	Total Indirect Costs (IC) =	$727,598	
Continency Cost (C) =	CF(IC+DC)=	$410,573	
Total Capital Investment =	**DC + IC +C =**	**$4,516,306**	**in 2021 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$280,613	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$659,151	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$989,286**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$90,326	
Property Taxes	= 1% of TCI	$45,163	
Insurance	= 1% of TCI	$45,163	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$339,716	
Indirect Annual Costs (IC) =		**$550,081**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$1,539,367**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,539,367	per year in 2021 dollars
CO/VOC Destroyed =	67.2	tons/year
Cost Effectiveness =	$22,893	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	8	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	105,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	110,000	acfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Catalyst Data:			
Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	0	$/ft^3	
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	390.6	1999 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs				
Total Purchased equipment costs (in 2021 dollars)				
Incinerator + auxiliary equipment[a] (A) =				
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2021 CEPI/1999 CEPCI) =	7.708333333	$1,517,523	in 2021 dollars
Instrumentation[b] =	0.10 × A =		$151,752	
Sales taxes =	0.03 × A =		$45,526	
Freight =	0.05 × A =		$75,876	
		Total Purchased equipment costs (B) =	$1,790,677	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)				
Foundations and Supports =	0.08 × B =		$143,254	
Handlong and Errection =		8760	$250,695	
Electrical =	0.04 × B =		$71,627	
Piping =	0.02 × B =		$35,814	
Insulation for Ductwork =	0.01 × B =		$17,907	
Painting =	0.01 × B =		$17,907	
Site Preparation (SP) =			$0	
Buildings (Bldg) =			$0	
		95	$537,203	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =		$2,327,880	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$179,068	
Construction and field expenses =	0.05 × B =	$89,534	
Contractor fees =	0.10 × B =	$179,068	
Start-up =	0.02 × B =	$35,814	
Performance test =	0.01 × B =	$17,907	
	Total Indirect Costs (IC) =	$501,389	
Continency Cost (C) =	CF(IC+DC)=	$282,927	
Total Capital Investment =	**DC + IC +C =**	**$3,112,196**	**in 2021 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/ft^3 cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$0	
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$339,689	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,283,573	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$2,672,783**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$62,244	
Property Taxes	= 1% of TCI	$31,122	
Insurance	= 1% of TCI	$31,122	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$234,099	
Indirect Annual Costs (IC) =		**$388,300**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$3,061,083**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,061,083	per year in 2021 dollars
VOC Destroyed =	23.1	tons/year
Cost Effectiveness =	$132,796	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	8	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	105,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	110,000	acfm	
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	541.7	2016 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs				
Total Purchased equipment costs (in 2021 dollars)				
Incinerator + auxiliary equipment[a] (A) =				
Equipment Costs (EC) for Regenerative Oxidizer	=[2.664 x 100,000 + (13.98 x Qtot)] x (2021 CEPI/2016 CEPCI) =	7.708333333	$2,202,174	in 2021 dollars
Instrumentation[b] =	0.10 × A =		$220,217	
Sales taxes =	0.03 × A =		$66,065	
Freight =	0.05 × A =		$110,109	
		Total Purchased equipment costs (B) =	$2,598,565	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)				
Foundations and Supports =	0.08 × B =		$207,885	
Handlong and Errection =		8760	$363,799	
Electrical =	0.04 × B =		$103,943	
Piping =	0.02 × B =		$51,971	
Insulation for Ductwork =	0.01 × B =		$25,986	
Painting =	0.01 × B =		$25,986	
Site Preparation (SP) =			$0	
Buildings (Bldg) =			$0	
		95	$779,569	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =		$3,378,134	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$259,856	
Construction and field expenses =	0.05 × B =	$129,928	
Contractor fees =	0.10 × B =	$259,856	
Start-up =	0.02 × B =	$51,971	
Performance test =	0.01 × B =	$25,986	
	Total Indirect Costs (IC) =	$727,598	
Continency Cost (C) =	CF(IC+DC)=	$410,573	
Total Capital Investment =	**DC + IC +C =**	**$4,516,306**	**in 2021 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$280,613	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$659,151	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$989,286**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$90,326	
Property Taxes	= 1% of TCI	$45,163	
Insurance	= 1% of TCI	$45,163	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$339,716	
Indirect Annual Costs (IC) =		**$550,081**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$1,539,367**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,539,367	per year in 2021 dollars
VOC Destroyed =	23.1	tons/year
Cost Effectiveness =	$66,781	per ton of pollutants removed in 2021 dollars

Appendix J
CU08/ST09 - VOC Control Option Supporting Data

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	95	125,000	323	28.01
VOC	8	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	115,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	120,000	acfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Catalyst Data:			
Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	0	$/ft^3	
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	390.6	1999 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2021 CEPI/1999 CEPCI) =	$1,595,744	in 2021 dollars
Instrumentation[b] =	0.10 × A =	$159,574	
Sales taxes =	0.03 × A =	$47,872	
Freight =	0.05 × A =	$79,787	
	Total Purchased equipment costs (B) =	$1,882,978	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$150,638	
Handlong and Errection =	0.14 × B =	$263,617	
Electrical =	0.04 × B =	$75,319	
Piping =	0.02 × B =	$37,660	
Insulation for Ductwork =	0.01 × B =	$18,830	
Painting =	0.01 × B =	$18,830	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$564,893	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$2,447,871	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$188,298	
Construction and field expenses =	0.05 × B =	$94,149	
Contractor fees =	0.10 × B =	$188,298	
Start-up =	0.02 × B =	$37,660	
Performance test =	0.01 × B =	$18,830	
	Total Indirect Costs (IC) =	$527,234	
Continency Cost (C) =	CF(IC+DC)=	$297,510	
Total Capital Investment =	**DC + IC +C =**	**$3,272,615**	**in 2021 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/ft^3 cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$0	
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$370,570	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,488,015	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$2,908,106**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$65,452	
Property Taxes	= 1% of TCI	$32,726	
Insurance	= 1% of TCI	$32,726	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$246,166	
Indirect Annual Costs (IC) =		**$406,783**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$3,314,889**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,314,889	per year in 2021 dollars
CO/VOC Destroyed =	223.5	tons/year
Cost Effectiveness =	$14,833	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	95	125,000	323	28.01
VOC	8	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	115,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	120,000	acfm	
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	541.7	2016 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=[2.664 x 100,000 + (13.98 x Qtot)] x (2021 CEPI/2016 CEPCI) =	$2,379,742	in 2021 dollars
	7.671232877		
Instrumentation[b] =	0.10 × A =	$237,974	
Sales taxes =	0.03 × A =	$71,392	
Freight =	0.05 × A =	$118,987	
	Total Purchased equipment costs (B) =	$2,808,095	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$224,648	
Handlong and Errection =	0.14 × B =	$393,133	
Electrical =	0.04 × B =	$112,324	
Piping =	0.02 × B =	$56,162	
Insulation for Ductwork =	0.01 × B =	$28,081	
Painting =	0.01 × B =	$28,081	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$842,429	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$3,650,524	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$280,810	
Construction and field expenses =	0.05 × B =	$140,405	
Contractor fees =	0.10 × B =	$280,810	
Start-up =	0.02 × B =	$56,162	
Performance test =	0.01 × B =	$28,081	
	Total Indirect Costs (IC) =	$786,267	
Continency Cost (C) =	CF(IC+DC)=	$443,679	
Total Capital Investment =	**DC + IC +C =**	**$4,880,470**	**in 2021 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$306,123	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$721,926	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$1,077,570**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$97,609	
Property Taxes	= 1% of TCI	$48,805	
Insurance	= 1% of TCI	$48,805	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$367,108	
Indirect Annual Costs (IC) =		**$592,040**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$1,669,610**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,669,610	per year in 2021 dollars
CO/VOC Pollutants Destroyed =	223.5	tons/year
Cost Effectiveness =	$7,471	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	8	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	115,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	120,000	acfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Catalyst Data:			
Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	0	$/ft^3	
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	390.6	1999 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2021 CEPI/1999 CEPCI) =	$1,595,775	in 2021 dollars
Instrumentation[b] =	0.10 × A =	$159,577	
Sales taxes =	0.03 × A =	$47,873	
Freight =	0.05 × A =	$79,789	
	Total Purchased equipment costs (B) =	$1,883,014	in 2021 dollars
Footnotes			
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.			
b - Includes the instrumentation and controls furnished by the incinerator vendor.			
Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$150,641	
Handlong and Errection =	0.14 × B =	$263,622	
Electrical =	0.04 × B =	$75,321	
Piping =	0.02 × B =	$37,660	
Insulation for Ductwork =	0.01 × B =	$18,830	
Painting =	0.01 × B =	$18,830	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$564,904	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$2,447,918	in 2021 dollars
Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$188,301	
Construction and field expenses =	0.05 × B =	$94,151	
Contractor fees =	0.10 × B =	$188,301	
Start-up =	0.02 × B =	$37,660	
Performance test =	0.01 × B =	$18,830	
	Total Indirect Costs (IC) =	$527,244	
Continency Cost (C) =	CF(IC+DC)=	$297,516	
Total Capital Investment =	**DC + IC +C =**	**$3,272,679**	**in 2021 dollars**
Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/ft^3 cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$0	
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$370,570	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,501,093	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$2,921,184**	**in 2021 dollars**
Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$65,454	
Property Taxes	= 1% of TCI	$32,727	
Insurance	= 1% of TCI	$32,727	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$246,170	
Indirect Annual Costs (IC) =		**$406,790**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$3,327,975**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,327,975	per year in 2021 dollars
VOC Destroyed =	25.1	tons/year
Cost Effectiveness =	$132,458	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	8	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	115,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	120,000	acfm	
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	541.7	2016 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=[2.664 x 100,000 + (13.98 x Qtot)] x (2021 CEPI/2016 CEPCI) =	$2,379,742	in 2021 dollars
Instrumentation[b] =	0.10 × A =	$237,974	
Sales taxes =	0.03 × A =	$71,392	
Freight =	0.05 × A =	$118,987	
	Total Purchased equipment costs (B) =	$2,808,095	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$224,648	
Handlong and Errection =	0.14 × B =	$393,133	
Electrical =	0.04 × B =	$112,324	
Piping =	0.02 × B =	$56,162	
Insulation for Ductwork =	0.01 × B =	$28,081	
Painting =	0.01 × B =	$28,081	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$842,429	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$3,650,524	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$280,810	
Construction and field expenses =	0.05 × B =	$140,405	
Contractor fees =	0.10 × B =	$280,810	
Start-up =	0.02 × B =	$56,162	
Performance test =	0.01 × B =	$28,081	
	Total Indirect Costs (IC) =	$786,267	
Continency Cost (C) =	CF(IC+DC)=	$443,679	
Total Capital Investment =	**DC + IC +C =**	**$4,880,470**	**in 2021 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$306,123	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$721,925	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$1,077,570**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$97,609	
Property Taxes	= 1% of TCI	$48,805	
Insurance	= 1% of TCI	$48,805	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$367,108	
Indirect Annual Costs (IC) =		**$592,040**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$1,669,610**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,669,610	per year in 2021 dollars
VOC Destroyed =	25.1	tons/year
Cost Effectiveness =	$66,453	per ton of pollutants removed in 2021 dollars

Appendix K
CU07/ST08 - VOC Control Option Supporting Data

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	78	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	15,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	15,000	acfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Catalyst Data:			
Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	0	$/ft^3	
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	390.6	1999 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2021 CEPI/1999 CEPCI) =	$517,612	in 2021 dollars
Instrumentation[b] =	0.10 × A =	$51,761	
Sales taxes =	0.03 × A =	$15,528	
Freight =	0.05 × A =	$25,881	
	Total Purchased equipment costs (B) =	$610,782	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$48,863	
Handlong and Errection =	0.14 × B =	$85,509	
Electrical =	0.04 × B =	$24,431	
Piping =	0.02 × B =	$12,216	
Insulation for Ductwork =	0.01 × B =	$6,108	
Painting =	0.01 × B =	$6,108	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$183,235	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$794,017	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$61,078	
Construction and field expenses =	0.05 × B =	$30,539	
Contractor fees =	0.10 × B =	$61,078	
Start-up =	0.02 × B =	$12,216	
Performance test =	0.01 × B =	$6,108	
	Total Indirect Costs (IC) =	$171,019	
Continency Cost (C) =	CF(IC+DC)=	$96,504	
Total Capital Investment =	**DC + IC +C =**	**$1,061,539**	**in 2021 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/ft^3 cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$0	
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$46,321	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$317,089	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$412,932**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$21,231	
Property Taxes	= 1% of TCI	$10,615	
Insurance	= 1% of TCI	$10,615	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$79,849	
Indirect Annual Costs (IC) =		**$152,023**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$564,955**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$564,955	per year in 2021 dollars
CO/VOC Pollutants Destroyed =	33.2	tons/year
Cost Effectiveness =	$17,000	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Recuperative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	78	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	15,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	15,000	acfm	
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	1,600	°F	* Note: Default value for Tfi is 1600°F for thermal recuperative oxidizers. Use actual value if known.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	390.6	1999 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Recuperative Thermal Oxidizer	= (21,342 x Qtot^(0.25)) x (2021 CEPI/1999 CEPCI) =	$416,575	in 2021 dollars
Instrumentation[b] =	0.10 × A =	$41,658	
Sales taxes =	0.03 × A =	$12,497	
Freight =	0.05 × A =	$20,829	
	Total Purchased equipment costs (B) =	$491,559	in 2021 dollars

Footnotes

a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.

b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$39,325	
Handlong and Errection =	0.14 × B =	$68,818	
Electrical =	0.04 × B =	$19,662	
Piping =	0.02 × B =	$9,831	
Insulation for Ductwork =	0.01 × B =	$4,916	
Painting =	0.01 × B =	$4,916	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$147,468	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$639,027	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$49,156	
Construction and field expenses =	0.05 × B =	$24,578	
Contractor fees =	0.10 × B =	$49,156	
Start-up =	0.02 × B =	$9,831	
Performance test =	0.01 × B =	$4,916	
	Total Indirect Costs (IC) =	$137,637	
Continency Cost (C) =	CF(IC+DC)=	$77,666	
Total Capital Investment =	**DC + IC +C =**	**$854,330**	**in 2021 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$38,265	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$624,582	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$712,369**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$17,087	
Property Taxes	= 1% of TCI	$8,543	
Insurance	= 1% of TCI	$8,543	
Capital Recovery	= CRF x TCI	$64,263	
Indirect Annual Costs (IC) =		**$128,149**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$840,517**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$840,517	per year in 2021 dollars
CO/VOC Pollutants Destroyed =	33.2	tons/year
Cost Effectiveness =	$25,292	per ton of pollutants removed in 2021 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	78	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	15,000	scfm	
Inlet volumetric flow rate(Q_{wi}) (actual conditions)	15,000	acfm	
Pressure drop (ΔP)	19	inches of water	* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	100	°F*	* 100°F is a default temperature. User should enter actual value, if known.
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	95	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2021			
CEPCI* for 2021	686.7	Enter the CEPCI value for 2021	541.7	2016 CEPCI
Annual Interest Rate (i)	4.25	Percent		
Electricity ($Cost_{elect}$)	0.0786	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$23.00	per hour		
Maintenance Labor rate	$32.00	per hour		
Contingency Factor (CF)	10.0	Percent		

* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2021 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=[2.664 x 100,000 + (13.98 x Qtot)] x (2021 CEPI/2016 CEPCI) =	$604,061	in 2021 dollars
Instrumentation[b] =	0.10 × A =	$60,406	
Sales taxes =	0.03 × A =	$18,122	
Freight =	0.05 × A =	$30,203	
	Total Purchased equipment costs (B) =	$712,793	in 2021 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2021 dollars)			
Foundations and Supports =	0.08 × B =	$57,023	
Handlong and Errection =	0.14 × B =	$99,791	
Electrical =	0.04 × B =	$28,512	
Piping =	0.02 × B =	$14,256	
Insulation for Ductwork =	0.01 × B =	$7,128	
Painting =	0.01 × B =	$7,128	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$213,838	
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	$926,630	in 2021 dollars

Total Indirect Installation Costs (in 2021 dollars)			
Engineering =	0.10 × B =	$71,279	
Construction and field expenses =	0.05 × B =	$35,640	
Contractor fees =	0.10 × B =	$71,279	
Start-up =	0.02 × B =	$14,256	
Performance test =	0.01 × B =	$7,128	
	Total Indirect Costs (IC) =	$199,582	
Continency Cost (C) =	CF(IC+DC)=	$112,621	
Total Capital Investment =	**DC + IC +C =**	**$1,238,833**	**in 2021 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	$38,265	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$94,259	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$12,593	
	Supervisor = 15% of Operator	$1,889	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$17,520	
	Materials = 100% of maintenance labor	$17,520	
Direct Annual Costs (DC) =		**$182,046**	**in 2021 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$29,713	
Administrative Charges	= 2% of TCI	$24,777	
Property Taxes	= 1% of TCI	$12,388	
Insurance	= 1% of TCI	$12,388	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$93,185	
Indirect Annual Costs (IC) =		**$172,451**	**in 2021 dollars**
Total Annual Cost =	**DC + IC =**	**$354,497**	**in 2021 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$354,497	per year in 2021 dollars
CO/VOC Pollutants Destroyed =	33.2	tons/year
Cost Effectiveness =	$10,667	per ton of pollutants removed in 2021 dollars

Appendix L
Coating - VOC Control Option Supporting Data

5.5.2.3 Control Assessment for the Coating Operations

Since the original permit application submittal, Fritz Winter has identified a U.S. manufactured and supplied coating that contained less xylene (4% rather than 6%) that will be used in the parts coating operation. However, the new formulation does result in a slightly higher VOC content. Refer to EXHIBIT E for the new Safety Data Sheets (SDS). Based on the latest production schedule Fritz Winter anticipates that peak production for Phase 1 equipment will be reached in 2019, with uncontrolled VOC emissions from the coating operations peaking at 16.1 TPY. Peak production for Phase 2 equipment will be reached in 2022, with uncontrolled VOC emissions from the coating operations peaking at 26 TPY and uncontrolled xylene emissions peaking at 5.4 TPY. A separate BACT cost effectiveness calculation has been completed for both Phase 1 and Phase 2 production.

Since the original permit application submittal, Fritz Winter has contacted numerous vendors of pollution control devices to obtain quotes for installation of a carbon adsorption/ regeneration system that DAQ determined to represent BACT in the current permit. Most vendors contacted did not offer onsite regeneration units or considered the relatively small amount of VOC emitted did not warrant a carbon regeneration system especially considering there is no way to recover or reuse the VOC in the process. They encouraged more cost effective control technologies. The vendors stated that onsite regeneration of activated carbon is viable only when the quantities of VOC are much greater and when the recoverable material is intended for re-used in the process. Fritz Winter did obtain cost estimates from two vendors for a regenerative carbon adsorption system as well as two quotes from vendors of RTOs for comparison. The actual vendor communications are provided in EXHIBIT H.

Evaluation of the traditional EPA BACT cost effectiveness calculation spreadsheet for a carbon adsorption system with actual vendor quotes, indicated that the cost of a carbon adsorption system is higher than the EPA spreadsheet used for the original permit application would indicate. Evaluation of the traditional EPA BACT cost effectiveness calculation spreadsheet for an RTO with actual vendor quotes indicated that the cost of an RTO is lower than the EPA spreadsheets appear to indicate. The lowest cost of the two vendor quotes was then inserted into the cost effectiveness calculations and the new cost effective results are provided in Table 5-3.

Table 5-3: Revised Cost Effectiveness Results with Vendor Quotes

Control Device	Original Application	Cost Effectiveness $/ton	
		End of Phase Construction	Revised Cost
Biofilter	$11,029	Phase 1	$43,385
		Phase 2	$26,866
Activated Carbon with Regeneration	$27,123	Phase 1	$47,410
		Phase 2	$29,357
Regenerative Thermal Oxidizer (RTO)	$27,609	Phase 1	$23,788
		Phase 2	$14,731

The revised cost effectiveness spreadsheet for a Biofilter is presented in Table 5-4a. The revised cost effectiveness spreadsheet for an n Activated Carbon unit with Regeneration is presented in Table 5-4b. The revised cost effectiveness spreadsheet for an RTO is presented in Table 5-4c. The results show that none of the control technologies are cost effective.

TABLE 5-4a Cost Effectiveness Evaluation for a Biofilter on the Coating Operation

TOTAL ANNUAL COST SPREADSHEET PROGRAM--BIOFILTER
Fritz Winter Paint Spray Booths Cost Effectiveness Calculation

Cost or Process Item	Data	Basis for Estimate
CPI Base Year (1998):	1,000	
CPI (2016):	1,474	Adjustment of captical cost for inflation per Consumer Price Index
INPUT PARAMETERS		
-- Gas flowrate (scfm):	17,425	Waste gas flow of 275,500 acfm @ 132 F reduced to standard conditons
-- Reference temperature (oF):	68	Standard temperature in Fahrenheight
-- Inlet gas temperature (oF):	93	Outlet exhaust temperature from booth
-- Inlet gas density (lb/scf):	0.0752	Density of air at standard conditions
TOTAL CAPITAL INVESTMENT ($)	502,662	Based on Correlation with SCFM presented in "Biofiltration of Ethanol Emissions from Bakery Operations" 99-371 Govind, Fangl and Melarkode
'Escalated to current dollars:	740,924	Cost in current dollars adjust by CPI
Annual interest rate (fraction):	0.06	Current average interest rate on working capital (SBA 6 to 7%)
Control system life (years):	10	Typical life of process equipment in this service
Capital recovery factor:	0.1359	Calculated from interest rate and life cycle
Taxes, insurance, admin. factor:	0.040	Typical additional cost factor for capital projects
Pressure drop (in. w.c.):	20	
ANNUAL COSTS		
Item	Cost ($/yr)	
Operating Cost including power,media replacer	302768	Based on Correlation with SCFM presented in "Biofiltration of Ethanol Emissions from Bakery Operations" 99-371 Govind, Fangl and Melarkode
Taxes, insurance, administrative	29,637	Standard tax and insurance rates
Capital recovery	100,668	Capital recovery based on above stated interest rate and life cycle
Total Annual Cost	433,073	Total Annual cost
Cost Effectiveness Assessment		
VOC Inlet	16.1	Total VOC emitted at maximum production after Phase 1
DRE	62%	Estimated DRE for RTO operation
VOC Removed	10.0	Total VOC Destruction Phase 1
Cost Effectiveness	**43,385 $/ton**	Cost Effectiveness $/ton (after Phase 1)
VOC Inlet	26.0	Total VOC emitted at maximum production after Phase 2
DRE	62%	Estimated DRE for RTO operation
VOC Removed	16.1	Total VOC Destruction Phase 2
Cost Effectiveness	**26,866 $/ton**	Cost Effectiveness $/ton (after Phase 2)

TABLE 5-4b Cost Effectiveness Evaluation for an Activated Carbon with Regeneration on the Coating Operation (revised)

TOTAL ANNUAL COST SPREADSHEET PROGRAM--CARBON ADSORPTION w/REGENERATION
Fritz Winter Paint Spray Booths Cost Effectiveness Calculation

Cost or Process Item	Data	Basis for Estimate
CPI Base Year (2016):	1,000	
CPI (2016):	1,000	Adjustment of captical cost for inflation per Consumer Price Index
INPUT PARAMETERS:		
-- Inlet stream flowrate (acfm):	18,250	Estimated actual air flow out of the coating booths
-- Inlet stream temperature (oF):	93	Estimated temperaterature leaving the booth
-- Inlet stream pressure (atm):	1	System is not under pressure or vacuum
-- VOC to be oxidized:	100%	No VOC can be recovered during desorption all oxidized
-- Inlet VOC flowrate (lb/hr):	5.78	Average hourly emissions of VOC
-- VOC molecular weight (lb/lb-mole):	106.00	Molecular weight of Xylene the primary component
-- VOC inlet volume fraction:	2.01E-05	Calculated from above lb moles of xylene/ lb moles of air
-- VOC inlet concentration (ppmv):	20	mole fraction in ppm form
-- VOC inlet partial pressure (psia):	0.00030	mole fraction in partial pressure form
-- Required VOC removal (fraction):	0.9	Highly adsorptive compounds such as xylene and C9 aromatics comprise only 80% of the total mixture remainder are much lower adsorption capacity
-- Freundlich isotherm equation constants for VOC (see Table 1 below):		
VOC number (enter Table 1 # or zero, if no data):	1,008	Freundlich Isotherm parameters for Xylene
K:	0.708	
M:	0.113	
-- Yaws isotherm equation constants (see Table 2 below):		
VOC number (enter Table 2 #or zero, if no data):	533	Yaw Isotherm parameters for Xylene
A:	1.31522	
B:	0.14019	
C:	-0.01457	
-- Adsorption time (hr):	168.0	Assumes one adsorber operates through entire week of operation
-- Desorption time (hr):	24.0	Time to prepare adsorber by heating to desorb and burning the vent gases
-- Number of adsorbing vessels:	2	Allows for a spare adsorber to come on line after breakthrough
-- Superficial carbon bed velocity (ft/min):	75	Average design value for adsorbers - gas velocity at cross sectional area
-- Carbon price ($/lb):	2.00	Current cost of carbon
-- Material of construction (see list below):[4]	1	Stainless steel (316) construction - corrosion resistant
DESIGN PARAMETERS:		
-- Carbon equilibrium capacity--Freundlich (lb VOC/lb carb):	0.2826	Determined from Freunlich Isotherm
" " " -- Yaws et al " " " "	0.2973	Determined from Yaws isotherm
-- Carbon working capacity (lb VOC/lb carbon):	0.14	Half of minimum theoretical equilibriam capacity since regenerated carbon does not return to virgin capacity
-- Number of desorbing vessels:	1	
-- Total number of vessels:	3	Allows 2 adsorbers in operation at all times to prevent breakthrough
-- Carbon requirement, total (lb):	10308	
-- Carbon requirement per vessel (lb):	3436	
-- Gas flowrate per vessel (acfm):	18250	Two adsorbers in series both treating total air flow
-- Adsorber vessel diameter (ft):	17.602	
-- Adsorber vessel length (ft):	4.471	
-- Adsorber vessel surface area (ft2):	733.88	
-- Carbon bed thickness (ft):	0.471	
-- Carbon bed pressure drop (in. w.c.): [5]	1.592	
CAPITAL COSTS		
Equipment Costs ($):		
Direct Captial Costs (DC)		
Purchased Equiment Costs (PE)		
Carbon Ad & Instrumentation	$550,000.00	Vendor Quote
Instrumentation	55,000	Cost Manual states 10% of equipment cost includes instrumentation to incorporate into the plant digital operating system
Ductwork	$32,000.00	
Sales Taxes	$33,000.00	6% (Sales tax in Texas which is the location of one of the vendors)
Freight	$27,500.00	5% of Equipment per Cost Manual
PE Total:	$697,500.00	Sum
Direct Installation Costs (DI):	$209,250.00	30% of PE per Cost Manual
DC Total:	$906,750.00	Sum of PE + DI
Indirect Capital Costs (IC)		
IC Total:	$216,225.00	31% of PE per Cost Manual
Total Capital Investment (TCI)	**$1,122,975.00**	Sum of DC and IC
Adsorber vessels/boiler & incinerator	1,122,975	Vendor quote for cost of 3 SS adsorbers and boiler/incinerator adjusted for direct and indirect costs
-- Carbon	20,615	Initial carbon cost does not allow for any losses
-- Other equipment (fan, duct work cooling, etc.)	0	
Total equipment cost ($)--base:	1,804,868	Total cost based on a regression analysis on treated exhaust volume
" " " --escalated:	1,804,868	Escalated cost over 1999 dollars
Gas Fired Boiler	25,000	There is no boiler intended to be on site so this is a small 1,000 lb/hr gas fired low pressure boiler
Small Oxidizer (200 cfm)	0	The cost of a small straight through gas fired oxidizer
Total Adsorption equipment and support equipment	1,829,868	
Purchased Equipment Cost ($):	1,976,258	Includes cost of taxes and freight
Total Capital Investment ($):	3,181,775	Allows for direct and indirect cost of installation of equipment see EPA/452/B-02-001 Table 1.5
" " " ($/acfm):	174.3	

TABLE 5-4b Cost Effectiveness Evaluation for an Activated Carbon with Regeneration on the Coating Operation – continued

ANNUAL COSTS: Item	Cost ($/yr)	
Operating labor	18,615	Based on rates listed above and hours of operator time
Supervisory labor	2,792	Standard overhead labor rates
Maintenance labor	18,615	Based on rates listed above and hours of operator time
Maintenance materials	18,615	Assumes parts cost equals labor
Electricity	4,554	Power factors listed in EPA/452/B-02-001 Page 1-35
Steam	1,063	Based on rates listed above and hours of desorption
Gas Usage	1,806	Assuming 200 cfm air purge through adsorber during desorption and gas used to elevate temp to 1400 F
Carbon replacement	8,680	Carbon life listed above and cost to replace
Overhead	35,182	Standard labor overhead factors for above
Taxes, insurance, administrative	127,271	Standard tax and insurance rates
Capital recovery	449,770	Capital recovery based on above stated interest rate and life cycle
Total Annual Cost	**$ 686,964**	Total Annual cost
Cost Effectiveness Assessment		
VOC Inlet	16.1	Total VOC emitted at maximum production after Phase 1
DRE	90%	Estimated DRE for carbon/incinerator operation
VOC Removed	14.5	Total VOC Destruction Phase 1
Cost Effectiveness	**47,410 $/ton**	Cost Effectiveness $/ton (after Phase 1)
VOC Inlet	26.0	Total VOC emitted at maximum production after Phase 2
DRE	90%	Estimated DRE for carbon/incinerator operation
VOC Removed	23.4	Total VOC Destruction Phase 2
Cost Effectiveness	**29,357 $/ton**	Cost Effectiveness $/ton (after Phase 2)

TABLE 5-4c Cost Effectiveness Evaluation for an RTO on the Coating Operation (revised)

TOTAL ANNUAL COST SPREADSHEET PROGRAM--REGENERATIVE THERMAL OXIDIZERS
Fritz Winter Paint Spray Booths Cost Effectiveness Calculation

Cost or Process Item		Data		Basis for Estimate
CPI Base Year (2016):		1,000		
CPI (2016):		1,000		Adjustment of captical cost for inflation per Consumer Price Index
	INPUT PARAMETERS			
-- Gas flowrate (scfm):		17,425		Waste gas flow of 18,250 acfm @ 93 F reduced to standard conditons
-- Reference temperature (oF):		68		Standard temperature in Fahrenheight
-- Inlet gas temperature (oF):		93		Outlet exhaust temperature from booth
-- Inlet gas density (lb/scf):		0.0752		Density of air at standard conditions
-- Primary heat recovery (fraction):		0.95		Assumed heat recovery efficiency for standard RTO
-- Waste gas heat content (BTU/scf):		0.105		VOC emission rate of 5.93 lb/hr and heat of combustion 18,600 BTU/lb divided by exhaust flow
-- Waste gas heat content (BTU/lb):		1.40		Calculate heat content based on mass of air leaving
-- Gas heat capacity (BTU/lb-oF):		0.255		Approximate heat capacity of air at exhaust gas conditions
-- Combustion temperature (oF):		1,400		Assumed combustion temperature to achieve combustion
-- Heat loss (fraction):		0.01		Heat loss from equipment
-- Exit temperature (oF):		158		Calculated exhaust gas temperature based on 95% thermal efficiency of the RTO
-- Fuel heat of combustion (BTU/lb):		20,083		Natural gas heat of combustion combustion (net)
-- Fuel density (lb/ft3):		0.0434		Density of Natural gas at standard conditions 96% methane 4% air
	DESIGN PARAMETERS			
Auxiliary Fuel Requirement (lb/min):		1.043		Revised to vendor expected usage of 1.257 mmBTU/hr
	(scfm):	24.0		maximum natural gas usage in scfm
Total Gas Flowrate (scfm):		17,449		Total exhaust gas flow including combustion air and fuel in scfm
Direct Captial Costs (DC)				
Purchased Equiment Costs (PE)				
	RTO & Integral Hardware	$425,000.00		Vendor Quote
	Interface Instrumentation	$42,500.00		Cost Manual states 10% of equipment cost includes instrumentation to incorporate into the plant digital operating system
	Ductwork	$32,000.00		
	Sales Taxes	$25,500.00		6% (Sales tax in Texas which is the location of one of the vendors)
	Freight	$21,250.00		5% of Equipment per Cost Manual
	PE Total:	$546,250.00		Sum
Direct Installation Costs (DI):		$163,875.00		30% of PE per Cost Manual
DC Total:		$710,125.00		Sum of PE + DI
Indirect Capital Costs (IC)				
IC Total:		$169,337.50		31% of PE per Cost Manual
Total Capital Investment (TCI)		**$879,462.50**		Sum of DC and IC
	@ 95 % heat recovery--base:		$ 879,463	Capital cost of RTO vendor quote (Gulf Coast Systems) as basis with a factored estimate of Direct & Indirect costs
	' ' ' --escalated:		$ 879,463	Cost in current dollars adjust by CPI
	ANNUAL COST INPUTS			
Operating factor (hr/yr):		8,760		Operating hours for the plant
Operating labor rate ($/hr):		34		Going Labor rate
Maintenance labor rate ($/hr):		34		Going Labor rate
Operating labor factor (hr/sh):		0.50		Time operator spends checking on RTO per shift per cost manual
Maintenance labor factor (hr/wk):		11		Overall average maintenance time on unit
Electricity price ($/kwh):		0.06925		Average commercial power rate in Kentucky from US Energy Information System
Natural gas price ($/mscf):		5.30250		Average cost of natural gas in Kentucky from US Energy Information System
Annual interest rate (fraction):		0.06		Current average interest rate on working capital (SBA 6 to 7%)
Control system life (years):		10		Typical life of process equipment in this service
Capital recovery factor:		0.1359		Calculated from interest rate and life cycle
Taxes, insurance, admin. factor:		0.040		Typical additional cost factor for capital projects
Pressure drop (in. w.c.):		20		
	ANNUAL COSTS			
Item		Cost ($/yr)		
Operating labor		18,615		Based on rates listed above and hours of operator time
Supervisory labor		2,792		Standard overhead labor rates
Maintenance labor		18,564		Based on rates listed above and hours of operator time
Maintenance materials		18,564		Assumes parts cost equals labor
Natural gas		66,989		Natural gas usage times cost per unit above
Electricity		48,530		Power usage based on vendor expected usage of 80 kw
Overhead		35,121		Standard labor overhead factors for above
Taxes, insurance, administrative		35,179		Standard tax and insurance rates
Capital recovery		119,491		Capital recovery based on above stated interest rate and life cycle
Total Annual Cost		**$ 363,845**		**Total Annual cost**
Cost Effectiveness Assessment				
VOC Inlet		16.1		Total VOC emitted at maximum production after Phase 1
DRE		95%		Estimated DRE for RTO operation
VOC Removed		15.3		Total VOC Destruction Phase 1
Cost Effectiveness		**23,788**	**$/ton**	Cost Effectiveness $/ton (after Phase 1)
VOC Inlet		26.0		Total VOC emitted at maximum production after Phase 2
DRE		95%		Estimated DRE for RTO operation
VOC Removed		24.7		Total VOC Destruction Phase 2
Cost Effectiveness		**14,731**	**$/ton**	Cost Effectiveness $/ton (after Phase 2)

For BACT comparison, Fritz Winter reviewed permits from similar facilities that practiced surface coating of iron cast parts, and identified three foundries. Their permits are provided in EXHIBIT H. Table 5-5 provides a list of the three facilities recently permitted that practice surface coating of iron cast parts. The agency issued permits for all three facilities do not require any kind of VOC treatment of emissions.

Table 5-5: Permit Requirements of Comparable Surface Coating Units at Iron Foundries

Iron Foundry	VOC Emissions	Permit Requirement
NIBCO Blytheville, AR	31 TPY	Filters on spray booths - no VOC controls
Asama Coldwater, MI	30 TPY	Filters on spray booths - no VOC controls
Brembo Homer, MI	43.5 TPY	Filters on spray booths - no VOC controls

5.5.3 SELECTION OF BACT SUMMARY FOR ALL THREE APPLICATIONS

For all three VOC generating operations Fritz Winter proposes a work practice for VOC BACT. Fritz Winter proposes a work practice for control of VOC from the PCS process by practicing and ensuring mold vent autoignition. The molds will be continuously observed by television monitors to ensure that the molds are autoigniting and the small burners are aimed appropriately so they will ignite any mold not already burning.

A work practice for the core shop is to ensure the pH of the sulfuric acid scrubber is maintained below a pH of 4.5 to ensure that amine is absorbed. As well as keep any unused resin containers closed.

A work practice proposed for the coating operation is to ensure any unused paint or solvent containers are covered at all times and the VOC content of the paint does not exceed 15%.

AMEC Foster Wheeler
Kentucky Auto Supplier
Paint Booth Exhaust

Gulf Coast Environmental Systems

GCES ABATEMENT EQUIPMENT COMPARISON COST OF OWNERSHIP

	GCES Thermal Oxidizer	GCES Regenerative Thermal Oxidizer (2-Canister)	GCES Deep Bed Regenerative Carbon System with RTO		Used Regenerative Thermal Oxidizer (2-Canister) - Refurbished
System Proposed	New	New	New		Refurbished
Oxidizer System Type	Thermal Oxidizer (TO)	Regenerative Thermal Oxidizer (RTO)	Deep Bed Regenerative Carbon / RTO		Regenerative Thermal Oxidizer (RTO)
Assumed VOC Loading Heat Release (btu/hr)	**67,500**	**67,500**	**67,500**		**67,500**
Maximum Capacity (SCFM)	**17,500**	**17,500**	**17,500**		**20,000**
Operating Air Flow (SCFM) - 100% of Plant Capacity	17,500	17,500	17,500		17,500
Operating Inlet Temperature (F)	**93**	**93**	**93**		**93**
Operating Process Vapor Inlet Pressure (in. w.c.)	0	0	0		0
Expected Operating Temperature (F)	1,400	1,400	93		1,400
Maximum Operating Temperature (F)	1,800	1,800	1,800	RTO Unit	1,800
Destruction Efficiency Guaranteed (% or less than 20 ppmv)	**95.0%**	**95.0%**	**95.0%**		**95.0%**
Heat Recovery Type	N/A	Structured Media	N/A		Structured Media
Expected Thermal Efficiency (%)	0%	95%	0%		95%

	In U.S. Dollars
Assumed Natural Gas Cost ($/mm btu)	**$5.00**
Assumed Electricity Cost ($/kW)	**$0.080**
Assumed Operating Hours Per Year	**6,000**

Provided BUDGETARY Equipment Price - EXW Conroe, TX					
Delivery, Installation, & Commissioning Separate					
Ductwork, Utility Supply, and Foundation not included	**$300,000**	**$425,000**	**$550,000**		**$300,000**
Approx. Lead Time to Shipment from Order & Initial Payment	**16 weeks**	**16 weeks**	**16 weeks**		**12 Weeks**
1st YEAR:					
Natural Gas Usage - btu/hr	*35,875,000*	*1,256,697*	*1,100,000*	For Steam & RTO	*1,229,394*
Projected Natural Gas Cost - 1 year	**$1,076,250**	**$37,701**	**$33,000**		**$36,882**
Electrical Usage - kW	*55*	*80*	*115*		*75*
Projected Electrical Cost - 1 year	**$26,400**	**$38,400**	**$55,200**		**$36,000**
Operation & Maintenance - 1 year	**$5,000**	**$7,500**	**$15,000**		**$7,500**
Cost of Ownership After 1 year (per year)	**$1,407,650**	**$508,601**	**$653,200**		**$380,382**
TWO YEARS:					
Projected Natural Gas Cost - 2 years	**$2,152,500**	**$75,402**	**$66,000**		**$73,764**
Projected Electrical Cost - 2 years	**$52,800**	**$76,800**	**$110,400**		**$72,000**
Operation & Maintenance - 2 years	**$10,000**	**$15,000**	**$30,000**		**$15,000**
Cost of Ownership After 2 years (per year)	**$1,257,650**	**$296,101**	**$378,200**		**$230,382**
FIVE YEARS:					
Projected Natural Gas Cost - 5 years	**$5,381,250**	**$188,505**	**$165,000**		**$184,409**
Projected Electrical Cost - 5 years	**$132,000**	**$192,000**	**$276,000**		**$180,000**
Operation & Maintenance - 5 years	**$25,000**	**$37,500**	**$75,000**		**$37,500**
Cost of Ownership After 5 years (per year)	**$1,167,650**	**$168,601**	**$213,200**		**$140,382**
TEN YEARS:					
Projected Natural Gas Cost - 10 years	**$10,762,500**	**$377,009**	**$330,000**		**$368,818**
Projected Electrical Cost - 10 years	**$264,000**	**$384,000**	**$552,000**		**$360,000**
Operation & Maintenance - 10 years	**$50,000**	**$75,000**	**$150,000**		**$75,000**
Cost of Ownership After 10 years (per year)	**$1,137,650**	**$126,101**	**$158,200**		**$110,382**

CHART ASSUMES CONSTANT PRICING (I.E. NO INFLATION) & CONSTANT VALUE UTILITY UNIT COSTS

CONFIDENTIAL INFORMATION FOR INTENDED RECIPIENT ONLY

Mueller, Gerald R

From: Sengupta, Utpal (Paul) <PSengupta@megtec.com>
Sent: Tuesday, November 08, 2016 11:44 AM
To: Mueller, Gerald R
Cc: Vandenberg, Robert
Subject: RE: Regenerative Carbon Adsorption

Hello Gerald

It was good to talk to you yesterday. As I mentioned to you, and assuming your client wants a long term solution, RTO may be the way to go here. I have copied my colleague, Mr. Robert Vandenberg who can help you with RTO pricing. Robert's contact information is:

Robert Vandenberg
Regional Sales Manager
Babcock & Wilcox MEGTEC
Direct: (920)-337-1489
Mobile: (920)-360-1105
rvandenberg@megtec.com

Carbon Adsorption Technology is technically viable here and given below are some rough order of magnitude numbers for both a **non-regenerable carbon adsorption system** (where the carbon is taken out of the system and replaced on an on-going basis) and an **onsite steam regenerable carbon adsorption system** you can use to see if this is economically viable or not. Feel free to modify the numbers as you see appropriate.

Design Basis

Air Flow: 18,250 CFM
Temperature: 93 degree F
VOC/Solvent Loading: 4.5 lbs/hour of mainly xylenes with some butyl acetate and ethyl benzenes

Non Regenerable Carbon Adsorption System

Capital Costs
Equipment Cost (blower, adsorber, carbon, controls, interconnecting ductwork and stack): ~ $300,000.00
Installation Cost (say an additional 50% of Equipment Cost): ~ $150,000.00

Operating Costs
Power: ~ 50kW or 1200 kwH/day or **$ 90 /day** based on $0.075/kwH cost.
Carbon Replacement: **$ 900.00 per day** based on ~30 wt% capacity of VOCs on carbon and $2.50 per lb carbon replacement cost.
Labor and Maintenance: Minimal

Steam Regenerable Carbon Adsorption System

Capital Costs
Equipment Cost: ~ $1,500,000.00
Installation Cost (based on additional 50% of equipment cost): $750,000.00

Operating Costs

Power: Similar to above say **$120.00/day**
Steam: Minimal say **$ 5.50/day** (based on cost of steam of $10/1000 lbs)
Labor and Maintenance: say **$50,000 per year**

I hope this information is helpful.

Best Regards,

Paul Sengupta, Solvent Recovery Division
Babcock and Wilcox MEGTEC
1201 19th Place Suite B-301
Vero Beach, FL 322960
T: 772 567 1320 (Office)
www.megtec.com

LEADING IN PRODUCTION EFFICIENCY

AMEC Foster Wheeler, Kentucky US04-83177

Dürr Systems, Inc.
Clean Technology Systems
26801 Northwestern Highway
Southfield, MI 48033
USA

Contact:
David Tyksinski
Phone: +1 248-450-2596
E-mail: david.tyksinski@durrusa.com

Dürr Systems, Inc. • Southfield, Michigan

AMEC Foster Wheeler
Gerald Mueller
1075 Big Shanty Road, Suite 100
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Fax:	+1 734-459-5837
E-mail:	david.tyksinski @durrusa.com
Date:	12/1/16

Subject: Dürr Systems, Inc. Budgetary Proposal No. US04-83177

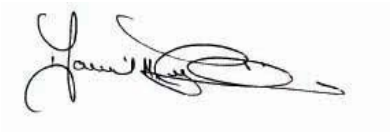
Dear Mr. Mueller:

Dürr Systems, Inc. is pleased to offer this budgetary proposal to supply an **Ecopure**® RL Regenerative Thermal Oxidizer (RTO) and Filter Box system to treat the VOCs from your process exhaust. The choice of the RL unit from our range of control technology options is based on an analysis of your actual process conditions, utility costs and space considerations:

- Limited space: The RL offers the lowest footprint of any RTO on the market and will fit within your designated area.
- Limited installation window: The Dürr **Ecopure**® RL is a unique pre-assembled modular RTO designed for easy installation.
- Ease of operation and low maintenance: The RL uses a single rotary valve with machined seats and air seals instead of multiple inlet, outlet and purge dampers.

We invite you to visit our fabrication facilities or a local site to see the benefits of this unit first hand. Please contact me to arrange a site visit or if you require additional information.

Best regards,
Dürr Systems, Inc.



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This proposal contains confidential and proprietary information of Dürr Systems, Inc. (CTS) and is not to be disclosed to any third parties without the express prior written consent of Dürr Systems. This proposal is submitted solely for the purpose of enabling the client to evaluate Dürr Systems bid on the project within and shall be returned to Dürr or destroyed if so requested by Dürr Systems, Inc.

1 Executive summary

We completed a full technical review of the process and source parameters sent with your request for quotation. We have determined that the use of a concentrator system is not recommended due to the amount of particulate/dust in the source air stream.

For this reason we have elected to propose a stand-alone filter house and RL thermal oxidizer system for abating the process air stream.

The enclosed proposal details a complete engineered thermal oxidizer system designed to abate VOC-contaminated exhaust air from your Foundry painting process. The proposed system will utilize a new Dürr RL rotary valve regenerative thermal oxidizer (RTO) to provide a robust, proven system that will achieve an overall system efficiency of 99% VOC destruction while providing up to 95% thermal efficiency.

Our proposal is based on your design inputs of flow, temperature, static pressure, VOC loading and VOC composition. Dürr would like to highlight some of the advantages that the RL design offers:

- ***Lower Inlet Pressure Fluctuations:*** Since the RL has 12 segmented beds (5 inlet and 5 outlet at any time) and only switches the direction of 20% of the air at each valve index, the RL generates < 12% variance from the inlet static pressure set-point, for a typical pressure fluctuation at the process of +/– 0.1 spwg .

- ***Lower Operating Costs:*** The RL typically operates at a lower combustion temperature set point than two-tower technology. A 2 bed system must run a long cycle time in order to achieve high DRE (> 98%). This extended cycle time results in a large variation in bed-preheat temperature entering the combustion chamber, which increases burner output cycling and gas usage. Since the RL only switches a small fraction of air during each index there is a shorter regeneration period and a smoother CC temp curve. This allows the RL to operate at a lower CC temperature, resulting in lower operating costs and reduced thermal shock to the heat recovery media.

- ***Greater Destruction Efficiency:*** The Dürr RL will easily achieve 99% DRE due to the integral flush system and valve air seal. It is difficult for a two-tower system to achieve >98 DRE. Achieving >98 DRE may require the addition of a 'puff chamber' and/or further extending the valve cycle time. If the puff chamber is used, additional volume and pressure fluctuations are introduced to the system resulting in additional operating costs. If the valve timing is extended to attain dRe, the thermal efficiency is sacrificed. In addition, if a lower destruction efficiency is required, the RL can operate at a lower combustion chamber temperature, resulting in lower operation costs.

- ***Less maintenance:*** The rotary valve in the Dürr RL is supported by a constant pressure air spring which creates a continuous seal against the stator as the valve advances. A typical two-tower system utilizes multiple inlet and outlet valves and actuators that need to be maintained. Competitive two-tower type rotary valve systems require pneumatic cylinders to actuate the valve. The constant motion of the pneumatic cylinder wears the center drive shaft prematurely. Additionally, the lip seals of the pneumatic cylinder require replacement yearly. Dürr has many installations with proven uptime in excess of 99%. The cost of downtime should never be overlooked in the purchase of any RTO.

Please click **HERE** to view a video about RL operation and installation.

1.1 Why Dürr?

Dürr is the one and only company for your environmental and energy solutions, from the initial planning stages to decades after the RL has been installed. We conduct the necessary engineering studies and analyses to ensure the right equipment design for your company's compliance needs.

Dürr is a worldwide company operating in 28 countries. The North American office is strategically located in Southfield, Michigan in a 226,745 ft^2 facility that is QS-9000/TE certified.

Dürr skills, strength and resources are that:

- We are the air pollution technology leader with the widest range of technology options available to solve your specific application and compliance issues.
- With over four decades of experience, Dürr will apply the proper application and complete integration of available technology.
- We provide 24 hour/7 days a week global service and support for Dürr and competitor systems.
- We employ dedicated, hardworking individuals whose number one goal is to provide you with the best product and experience possible.

Following a detailed analysis of your process conditions and parameters and a review of all the available solutions, we conclude that the **Ecopure**® RL is the best system for your application. The RL is a state-of-the-art RTO design featuring a single rotary diverter valve, twelve heat recovery chambers enclosed in a single tower, and structured ceramic heat exchange media for maximum thermal efficiency and the lowest operating costs. The modular RL system is designed for maximum pre-assembly in the factory ensuring quality and minimal field installation time.

The Filter Box and RL-50 unit proposed is designed to treat 45,000 SCFM of exhaust from your Foundry Spraying process and offers the highest destruction efficiency of any RTO available on the market. The following are some of the key features of the RL system:

Standard RL Features	Customer Benefits
Skid mounted design (pre-piped, pre-wired)	Fast installation reduces cost
Single rotary valve	Reduced maintenance, increased reliability, high destruction efficiency
Integral air-conditioned control room	No need to find space for control panel, and pre-wiring reduces installation cost
Rotary valve is always in contact with hot exhaust gas	Reduces potential build-up of condensables on valve
Electric rotary valve drive	Increased reliability over hydraulic or pneumatic systems.
All drive components external to unit	Ease of access for maintenance
All fuel train components located at grade	Ease of access for maintenance
Compact design	Reduced foundation costs
Twelve heat recovery chamber design	Minimal pressure fluctuations Better air distribution Improved RTO performance
Continuous purge	Maximizes destruction efficiency
Bakeout	Reduces organic buildup and improves energy efficiency
Variable frequency drive (VFD)	Minimizes energy usage
Fresh air/purge damper	Independent start-up from RTO

Our proposal is for a RTO system to be delivered to your facility. Optional installation services and freight to site are included for your consideration, as well as clarifications on utilities and other services to be provided for the installation.

Ecopure® RL electric drive

1.2 References

Location: Kentucky
Industry: Chemical

Location: Florida
Industry: Metal & Plastic Packaging

Location: Kansas
Industry: Feed & Pet Food

Location: Virginia
Industry: Electronics

Location: Washington
Industry: Carbon Fiber

Location: Texas
Industry: Roofing Materials

1.3 Equipment pricing and schedule

1.3.1 Budgetary Equipment Pricing

Item 1 – Equipment One (1) **Ecopure**® RL-50 & Filter Box as described within. FCA Origin.	$920,000
Item 2 – Installation of Item 1 Installation of RL	$150,000
Item 3 – Freight - pre pay and add Budget cost for Item 1	$ 33,300
Item 4 – Installation Supervision Durr includes 150 hours of installation supervision. Additional labor required due to circumstances beyond Durr's control is per Durr standard rates attached.	$ 26,500
Item 5 – Start-up / Commissioning & Training Durr includes 150 hours of Start-up / commissioning and Training (training must coincide and immediately follow startup and commissioning activities). Additional labor required due to circumstances beyond Durr's control is per Durr standard rates attached.	$ 22,500

Pricing issued for informational purposes only. No purchase order will be accepted based on this proposal

All prices exclude any taxes, duties, broker fees, value-added taxes, income taxes, withholding taxes or any other allowances.

1.3.2 Typical Payment terms and payment schedule

25% due upon receipt and acceptance of purchase order
25% invoiced with drawing submittal, due net 30 days
45% due upon equipment ready for shipment, due net 30 days
5% due after successful performance testing
- Or - thirty days after equipment is made operational
- Or - if due to delays beyond Dürr's control, 90 days after final material shipment, whichever occurs first

Dürr will furnish detailed project schedule to meet the customer's needs after receipt and acceptance of purchase order.

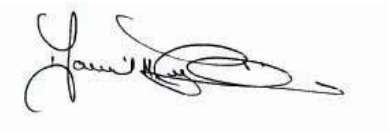
1.3.3 Typical delivery milestones

RTO delivery	20-24 weeks*
RTO installation	1-2 additional weeks
System start-up	1-2 additional weeks

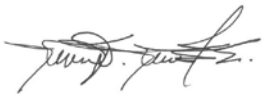
*RTO delivery to be confirmed at the time a purchase order is issued by buyer and accepted by Dürr

If for any reason this information is withheld from Dürr, the third milestone payment will be due net 0 days.

Dürr Systems, Inc.



By: _____
David Tyksinski
Key Account Manager

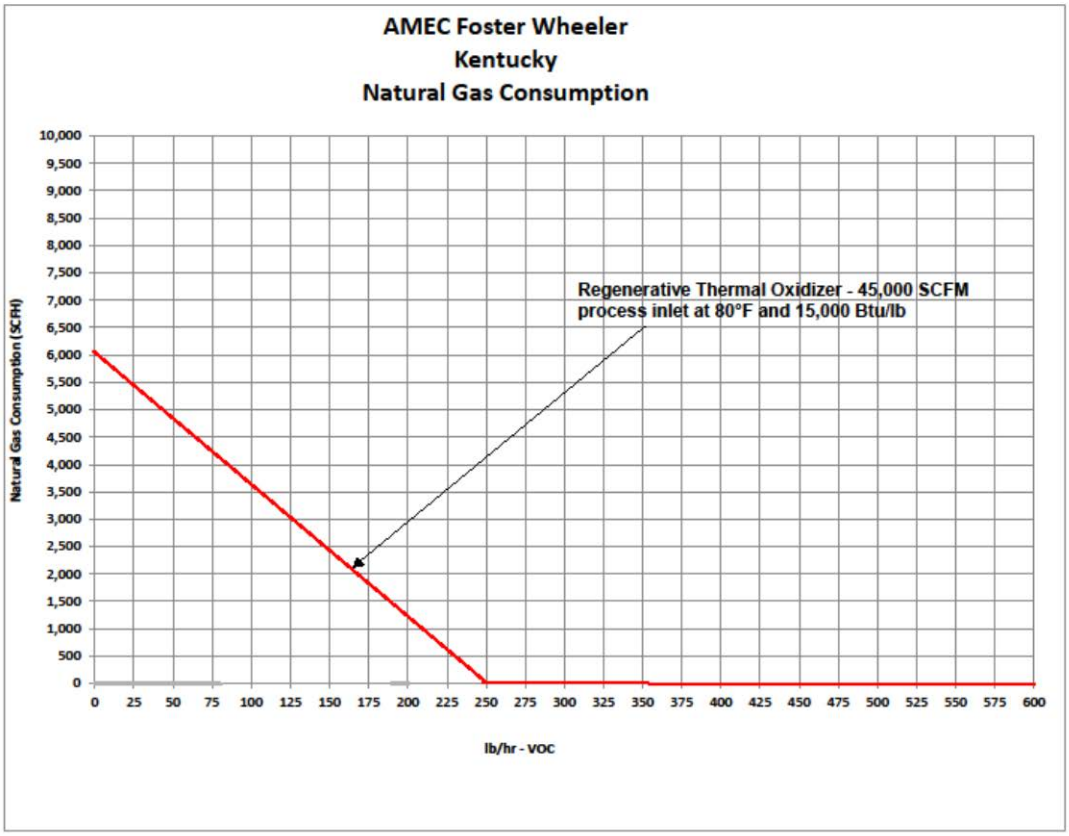


By: _____
Kevin D. Kennard Sr., P.E.
Applications Engineer

1.4 Estimated operating conditions

The following estimates of operating energy for the proposed RL unit are based on the process data provided:

Process exhaust: 45,000 SCFM @ 80 F
VOC Loading: 100 Lbs./Hr. (Assumed)



1.5 Performance guarantee

1.5.1 Volatile organic compounds (VOCs)

Subject to the General Provisions below, Dürr guarantees that when the inlet VOC concentration is above **250** ppm_v as propane, the RTO will destroy or convert at least **98**% of the incoming gaseous, non-methane volatile organic compounds (Inlet VOC as identified in Section 2.0 of this document). When the inlet VOC concentration is below **250** ppm_v as propane, the outlet non-methane VOC concentration will not exceed **5** ppm_v as propane.

1.6 General provisions

The following General Provisions will apply to all of the above guarantees:

a) The RTO will be installed (if applicable), operated and maintained by Buyer in accordance with Dürr instructions. This will include replacing of consumable or replaceable components by Buyer, as required.
b) Buyer agrees to operate the system within the system design data as specified in this proposal.
c) The performance guarantees apply only during normal operation, not during any maintenance procedures.
d) All functional tests will be arranged and paid for by Buyer. Dürr will be notified in writing 14 days prior to the tests for scheduling purposes.
e) Methane is excluded from outlet emissions.
f) Dürr reserves the right to adjust the burner chamber operating temperature as required to meet the guarantees.

If Dürr fails to meet the Performance Guarantee, Dürr will be given reasonable time to investigate and take corrective action within the scope of this contract.

1.7 Work to be provided by buyer

- Supply the following utilities to the connection points on the RL
- Fuel: Adequate supply of Natural Gas at 1,000 Btu/ft³ and regulated to 5.0 PSI steady.
- Power: 480 V, 3 PH, 60 Hz, with earth grounding.
- Air: 2 CFM of intermittent compressed air at 80 psig. Clean, dry air, suitable for outdoor use at local plant conditions is required.
- Failsafe inlet isolation damper
- Barometric damper or vacuum relief damper.

1.8 Clarifications

- Buyer certifies that there are no halogenated, acid generating, silicon bearing or phosphor compounds present in the inlet air stream coming to the proposed equipment. This includes, but is not limited to, fluorides, chlorides, bromides, iodides, astanides and sulfonated compounds. This warranty excludes deterioration arising from the presence of any of these compounds.
- Buyer certifies that the total alkali metal content does not exceed 5% of the total particulate discharged from the dryer. If alkali metals are in gaseous or liquid phase, acceptable concentration to be determined.
- If present, silicon-bearing compounds may cause plugging of the ceramic media and may require periodic cleaning and/or replacement of the media.
- If present, phosphor compounds may cause permanent plugging of the ceramic media and therefore require replacement.
- Fan, valve, RL skid ductwork and stack insulation are not included.
- Installation and connection of any remote HMI is by purchaser.
- Unless noted otherwise in this proposal, the equipment quoted is to Dürr Systems, Inc. standard design specifications. Any specification not mentioned but required by owner is subject to review and price adjustment.
- Note that condensate will form from combining hot oven air sources and cooler spraybooth emissions. If no filtration is to be included for the system, bake-outs or cleaning of the RL may be required. Frequency of these bake-outs is dependent on the efficiency of the spraybooth scrubbers and the amount of condensate formed from the hot and cold sources.
- Optional installation by a Dürr erection crew or subcontractor is based on the following items:
  There are no overhead obstructions.
  There is clear access, within 30 feet, to at least two sides of the site.
  The work will be performed by a non-union contractor.
  The work will be done on a straight time labor rate based on an eight hour day, five days a week (Monday through Friday), forty hours a week total. Any work required to be performed on Saturdays, Sundays, holidays or on an overtime basis will be to Purchaser's account. Any costs due to delays beyond Dürr's control will be to Purchaser's account.
  All safety procedures are to be per Dürr Systems standard procedures.

2 Technical data and responsibility matrix

2.1 Technical data

Customer specification	Design (per RTO)
Inlet temperature	80 °F
Inlet static pressure	(-) 2 in. w.c. @ inlet to RL unit
Moisture content	Std
Altitude	630 ft
Specified actual max. volume	45,000 scfm
VOC loading	Not provided, customer will provide for final design engineering. Dürr assumed a value of 100 lb/hr for this budgetary proposal.
VOC type	Methanol, Petroleum Distillates (hydrotreated light), Naphtha (petroleum - hydrotreated heavy), Solvent Naphtha (petroleum – light aromatic)
Total particulate loading maximum	Not provided, customer will provide for final design engineering
Estimated operating conditions	
Process airflow and temperature	45,000 scfm at 80 °F process air inlet temp.
Natural Gas	
With zero lbs/hr VOCs @ 15,000 Btu/lb	5.32 mmBtu/hr of net fuel heat input
With 100 lbs/hr VOCs @ 15,000 Btu/lb	3.09 mmBtu/hr of net fuel heat input
With 247.29 lbs/hr VOCs @ 15,000 Btu/lb	0.00 mmBtu/hr of net fuel heat input
Compressed air	2 scfm @ 80 psig at 100 lb/hr VOCs
Electric	135 kW usage at 100 lb/hr VOCs
Design parameters	design
Number of chambers	12 individual chambers
Heat exchanger media	Structured packing (monolith block)
Heat exchanger thermal efficiency	95.36 % mass corrected
Combustion chamber operating temperature	1,550°F
Bake-out	Type, manufacturer or comment
Off-line	Included
Utilities connections	
Natural Gas (burner max capacity)	7.4 scfh @ 5 psi connection point at RL skid
Compressed air	2 scfm @ 80 psi connection point at RL skid (connected peak)
Electric	480/3/60 to connection point on RL Skid

Dürr Systems, Inc. reserves the right to make modifications as deemed necessary during final engineering.

Specifications incorporated	
Customer specifications	None provided
ECOPURE® RL chamber	Type, manufacturer or comment
Materials of construction - upper chamber	3/16" thk., A36 plate., A992 structural
Materials of construction - lower chamber	1/4" thk., A36 plate., A992 structural
External coating	Finish paint, #34 Medium Gray
Internal coating	Not required
ECOPURE® RL chamber insulation	Type, manufacturer or comment
Interior combustion chamber	6" thk. 10 lb/ft³
Media support	Corten
Burners	Type, manufacturer or comment
Manufacturer	North American or Dürr approved equal
Number of burners	One (1) per RL unit
Flame monitor	UV scanner
Air injection	Included
Gas injection	Not included
Fuel enhancement	Not included
Gas trains	Type, manufacturer or comment
Blocking valve manufacture	Maxon or equiv
Combustion blower	New York Blower, with silencer, arrangement #4, 3600 rpm
NFPA 86 standard	pre-approved
Gas train enclosure	Not included
Burner/gas train access platform	Diamond plate
Platform access	OSHA standard-caged ladder
Individual components UL & FM listed	Included
Natural gas meter	Not included
Diverter valve and drive system	Type, manufacturer or comment
Diverter valve	Heavy duty carbon steel construction
Drive motor	3 hp, 480 volt, 3 ph, 60 hertz
Drive motor VFD manufacturer	SEW Movidrive
Gear drive guards	Personnel protection

Dürr Systems, Inc. reserves the right to make modifications as deemed necessary during final engineering.

Fan	Type, manufacturer or comment
Type	Centrifugal
Quantity	One (1)
Manufacturer	New York Blower or equal
Volume	45,000 scfm, 80° F inlet temperature
Arrangement	Included
Materials of construction	Mild steel
Inlet/Outlet flex connections	Included
Inlet/Outlet flex connections materials of construction	Fabric
Fan insulation and cladding	Not included
Motor size, RPM, manufacturer	200 hp., 1800 rpm, manufacturer
Motor service factor	1.00
Fan bearing and motor mounting plate	Included
Fan bearing forced lubrication system	Not included
Fan bearing temperature monitoring	Not included
Fan vibration switch	Included
Filter House	
Unit Component Sections	Pre-Filter, Intermediate Filter, Final Filter
Differential Pressure	Magnehelic Gauges for the above sections
Exterior, Interior, Floor Liner	Galvanized Steel
Dimensions	17’6” L x 11’8” W x 11’4” H
System controls	Type, manufacturer or comment
Master control panel	NEMA 12 for dust free and temperature controlled environment.
Programmable controller (PLC)	Allen-Bradley Compact Logix
Human machine interface (HMI)	Panel View Plus 700
PLC software	RS Logix
Programming, screen development, etc.	Included
Operating modes	Type, manufacturer or comment
Automatic sequence start	Included
Automatic sequence stop	Included
Fresh air stand-by mode	Start-up capability on fresh air
Hot shutdown mode	Included
Chart recorder	Endress+Hauser
Inlet temperature	Included
Outlet temperature	Included
Combustion chamber temperature	Included
Flame safeguard control	Honeywell
High temperature limit	Honeywell
Variable Frequency Drive	Type, manufacturer or comment
VFD manufacturer	Yaskawa
VFD size/quantity	200 hp.

Dürr Systems, Inc. reserves the right to make modifications as deemed necessary during final engineering.

Control room	Type, manufacturer or comment
Manufacturer	Dürr
Control room lighting	Included
Lighting transformer	Included
Heated & air conditioned	Included
Personnel access door with removable header	Included
Power distribution panel	Included
Exhaust stack	Type, manufacturer or comment
Height	30 ft
Materials of construction	A36
Personnel protection	Not included
Insulation & cladding	Not included
Test ports	Included
Stack drain	Included
Sampling platform	Not included. Access ports from RL roof
Safety ladder	Not included
Interconnecting manifolds	Type, manufacturer or comment
Inlet/outlet manifold diameter	Varies
Inlet/outlet manifold construction	12 ga. minimum carbon steel
Inlet/outlet manifold flex connectors	Fabric
Inlet/outlet manifold velocity	3,500 fpm
Personnel protection	Not included
Insulation and cladding	Not included
Dampers	Type, manufacturer or comment
Inlet isolation damper	Not included
Outlet isolation	Not included
Fresh air intake damper	Included
Inlet/outlet manifold vacuum breaker	Not included
Miscellaneous	Type, manufacturer or comment
Area lighting on the RTO only	Not Included
Source duct work	Type, manufacturer or comment
Process ductwork	Not included
Duct supports	Not included
Fire detection and suppression systems	Not included

Dürr Systems, Inc. reserves the right to make modifications as deemed necessary during final engineering.

Responsibility matrix

	Work Item	Owner	Dürr	Remarks
1.0	General conditions			
1.1	Building permits	X		
1.2	EPA permits	X		
1.3	Taxes	X		
2.0	General site work conditions			
2.1	Temporary utilities	X		
2.2	Daily job site clean-up	X		Optional installation
2.3	Building alterations, penetrations	X		If required
2.4	Temporary storage area on-site	X		If required
2.5	Demolition and disposal work			NA
3.0	Civil			
3.1	Footings and foundations	X		With grounding grid
3.2	Structural support steel			NA
4.0	Mechanical			
4.1	Piping fuel and gas	X		To connection point on RL
4.2	Compressed air piping	X		To connection point on RL
4.3	Fire protection	X		If required
5.0	Electrical			
5.1	Power feed	X		To Dürr control room on RL
5.2	Process interlock wiring	X		
6.0	Abatement equipment			
6.1	Engineering and fabrication of the abatement equipment as described in Technical Section		X	
6.2	Freight	X		Pre-pay and add
6.3	Installation		X	Optional
6.4	Installation supervision		X	150 hrs. on site
6.5	Start-up		X	150 hrs. on site
6.6	Operator training		X	In above
7.0	Plant acceptance			
7.1	Functional testing	X		
7.2	Compliance testing	X		
7.3	Spare parts		X	List only
7.4	Maintenance and operating manuals		X	One (1) CD copy, English only
7.5	Record mechanical and electrical drawings		X	One (1) CD copy, English only

3 RL system drawings (attached)

3.1 Process flow diagram

Please see the attached process low diagrams.

3.2 General arrangement

Please see the attached general arrangement diagrams.

3.3 Foundation loading

Please see the foundation loading diagrams.

4 RL brochure

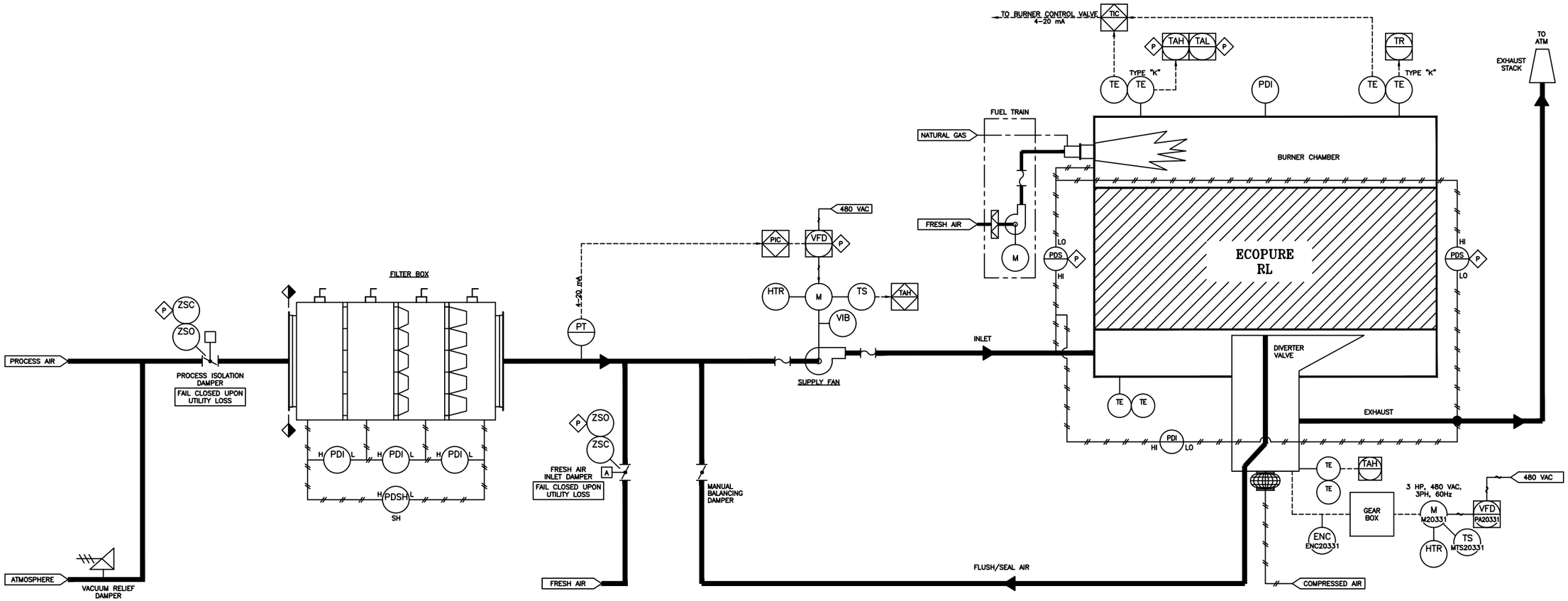
Please see the attached RL brochure.

5 Dürr terms and conditions (online document)

Please click **HERE** to view Dürr's Terms and Conditions, under the DSNA General Terms and Conditions of Sale link.

6 Service rates (attached)

Please see attached Service Rates.



P THIS INDICATES THAT THE DEVICE IS USED IN THE HARDWIRED PURGE CIRCUIT.

B THIS INDICATES THAT THE DEVICE IS USED IN THE HARDWIRED BURNER CIRCUIT.

SEE ELECTRICAL DRAWING FOR PURGE AND BURNER PERMISSIVES.

PRELIMINARY

AMEC FOSTER WHEELER
KENTUCKY

REV	DESCRIPTION OF CHANGE	DATE	BY

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CKD		
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LEGEND

BY OTHER'S ◇ BY DÜRR

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DÜRR SYSTEMS, INC.

DÜRR SYSTEMS, INC.
CLEAN TECHNOLOGY SYSTEMS
26801 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN

PROJECT – AMEC FOSTER WHEELER

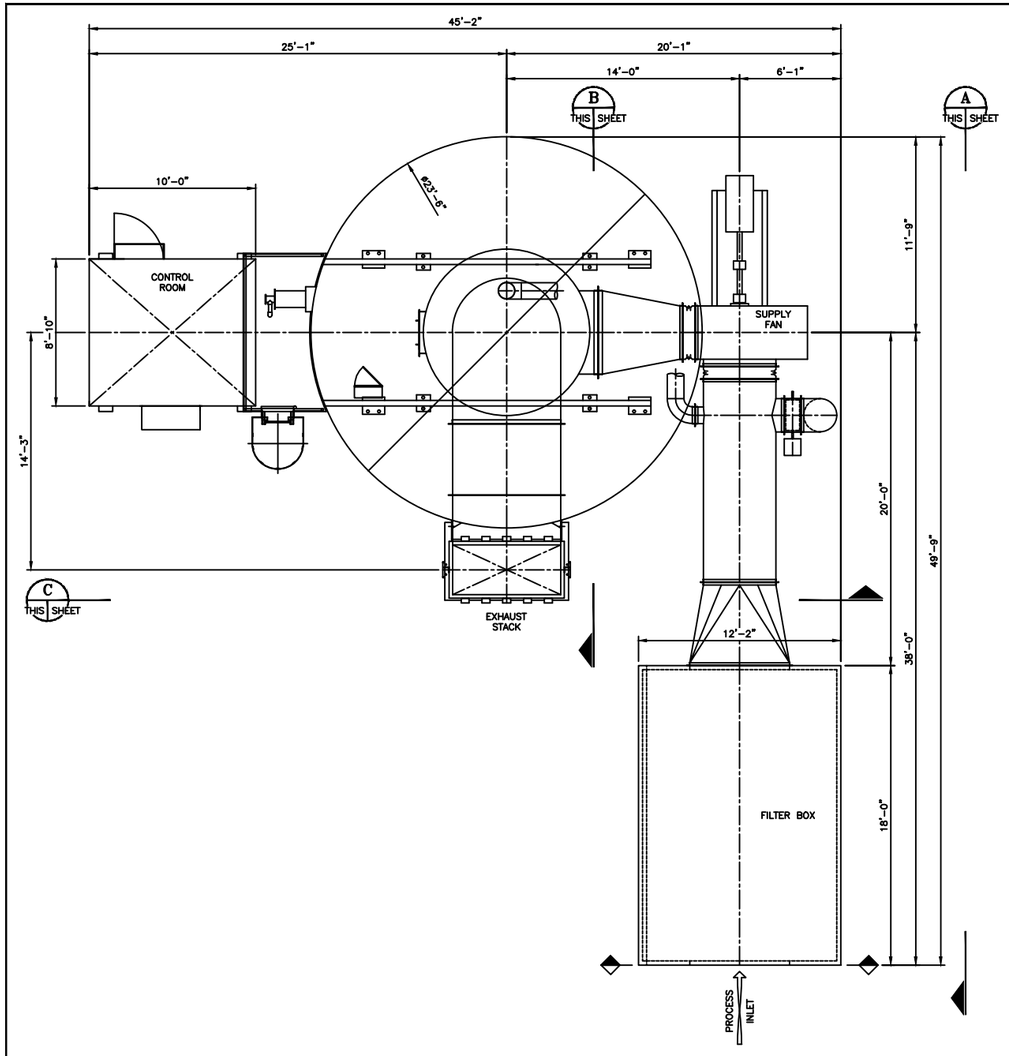
TITLE
VOC EMISSION CONTROL ABATEMENT SYSTEM AIR FLOW SCHEMATIC

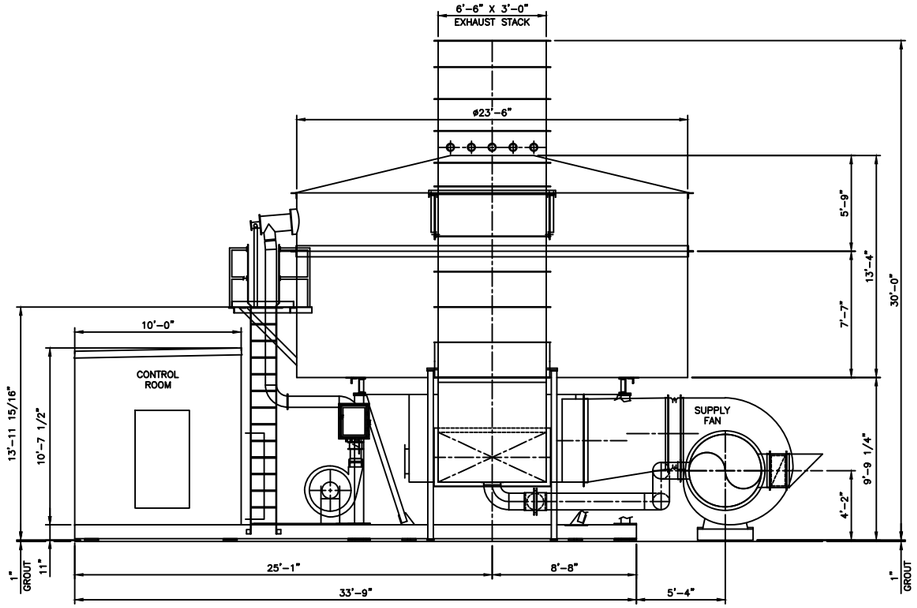
JOB NUMBER US04-83177

DURR DRAWING NUMBER F002 REV –

DURR STANDARD NUMBER –

ACAD PART NAME:





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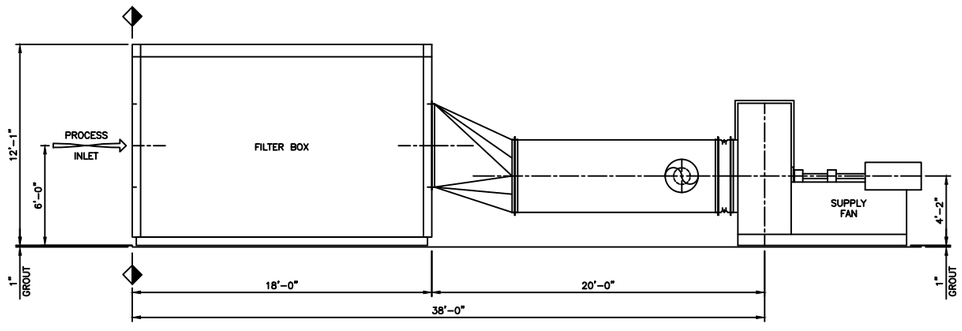

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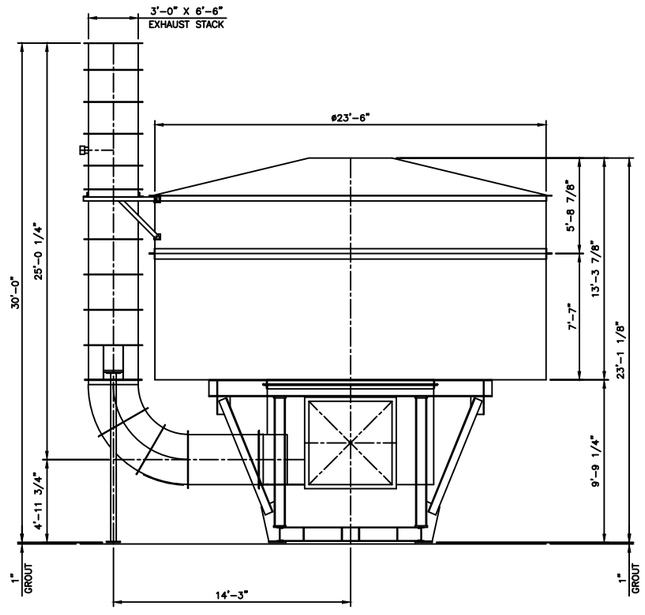

SECTION B
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LEGEND

BY OTHER'S ◇ BY DÜRR

PRELIMINARY

AMEC FOSTER WHEELER
KENTUCKY

REV	DESCRIPTION OF CHANGE	DATE	BY

	DATE	BY
DRN	11.22.16	BRR
CKD		
APPD		KK

SCALE: NOTED

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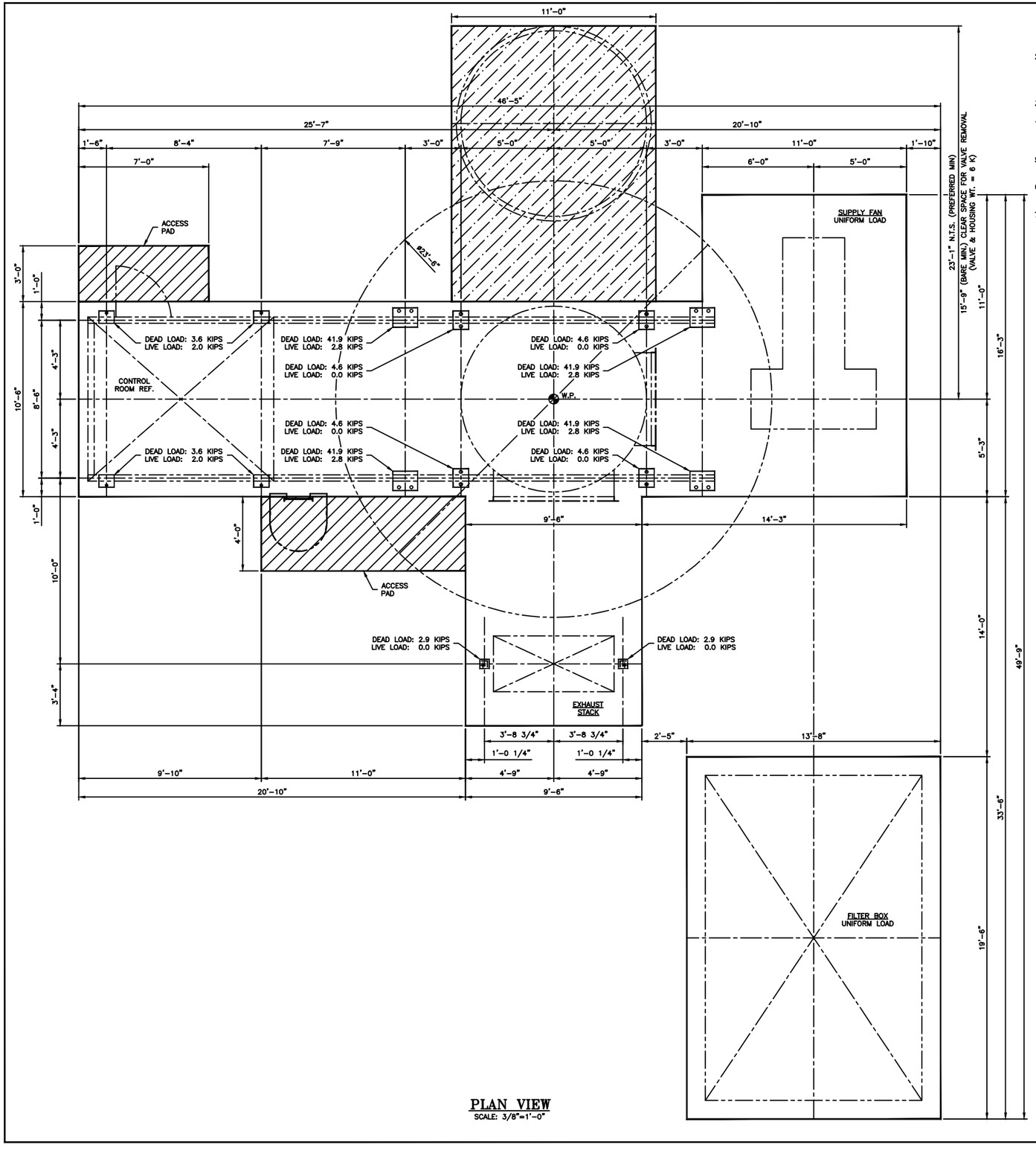
SOUTHFIELD, MICHIGAN

PROJECT – AMEC FOSTER WHEELER

TITLE
VOC EMISSION CONTROL ABATEMENT SYSTEM GENERAL ARRANGEMENT

JOB NUMBER	
US04-83177	
DURR DRAWING NUMBER	REV
M001	–
DURR STANDARD NUMBER	
–	

ACAD PART NAME:

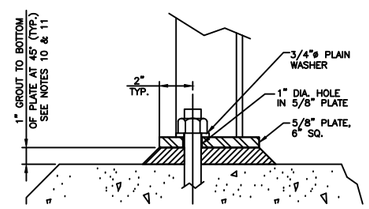


PLAN VIEW
SCALE: 3/8"=1'-0"

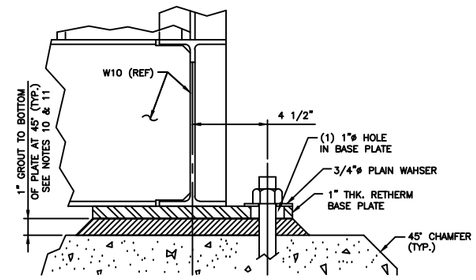
INSTALLATION NOTES

1. ALL FOUNDATION ENGINEERING SHALL BE BY OTHERS.
2. PAD DIMENSIONS SHOWN SHALL BE CONSIDERED AS MINIMUMS FOR EQUIPMENT ACCESS. DURR SYSTEMS, C.T.S. RECOMMENDS THAT ALL EXPOSED FOUNDATION EDGES BE BEVELED TO PREVENT CHIPPING. TOP OF ACCESS PADS SAME ELEVATION AS RTO PAD.
3. FOUNDATION CONCRETE ELEVATION TOLERANCE SHALL BE ±1/8".
4. FOUNDATIONS WILL BE CHECKED PRIOR TO EQUIPMENT PLACEMENT. ANY DISCREPANCIES IN FOUNDATION ELEVATIONS SHALL BE CORRECTED BY FOUNDATION INSTALLER BEFORE EQUIPMENT PLACEMENT WILL COMMENCE.
5. FOUNDATIONS SHALL BE FREE FROM DIRT, GREASE AND OTHER SUBSTANCES, PRIOR TO GROUT PLACEMENT.
6. ANCHOR BOLT DESIGN, INCLUDING MATERIAL SELECTION AND EMBEDMENT LENGTH, SHALL BE PERFORMED BY THE FOUNDATION DESIGN ENGINEER.
7. DURR SYSTEMS, C.T.S. RECOMMENDS THAT THE RTO INSTALLER USE "CHEMICAL SET" ANCHOR BOLTS, TO BE INSTALLED AT THE TIME OF SKID PLACEMENT; AND SEPARATE "CHEMICAL SET" ANCHOR BOLTS BE USED FOR THE RTO STACK AND FAN/MOTOR (IF APPLICABLE).
8. DRILLED– IN– PLACE ANCHOR BOLTS AND ASSOCIATED HARDWARE SHALL BE FURNISHED AND INSTALLED BY THE RTO INSTALLATION CONTRACTOR.
9. RTO INSTALLATION CONTRACTOR SHALL SHIM AND GROUT RTO SKID AND STACK BASE PLATES, AND FAN AND MOTOR SUPPORTS (IF APPLICABLE). DURR SYSTEMS, C.T.S. RECOMMENDS A 1" ALLOWANCE FOR SHIMS AND GROUT. MATERIAL RECOMMENDATIONS:
   - 9.1 SKID AND STACK SHIMS: _____ CARBON STEEL SHIM STOCK
   - 9.2 FAN AND MOTOR SHIMS (IF REQUIRED): _____ 304ss SHIM STOCK
   - 9.3 GROUT: _____ MASTERBUILDERS "MASTERFLOW" # 928 OR EQUAL (CONSULT DURR SYSTEMS, C.T.S. IF LESS THAN 1" OF GROUT IS REQUIRED)

   FOR PROPER INSTALLATION, FOLLOW GROUT MANUFACTURER'S INSTRUCTIONS.
10. GROUT SHALL BE TRIMMED TO BOTTOM OF BASEPLATES AT A 45 DEGREE ANGLE – NOT TO TOP OF BASEPLATES!
11. CONSULT DURR SYSTEMS, C.T.S. FOR SPECIAL GROUTING APPLICATIONS:
    - 11.1 AREAS OF KNOWN CHEMICAL ATTACK
    - 11.2 APPLICATION OF GROUT IN AMBIENT TEMPERATURES OTHER THAN RECOMMENDED BY GROUT MANUFACTURER
    - 11.3 EPOXY GROUT APPLICATION/USAGE.



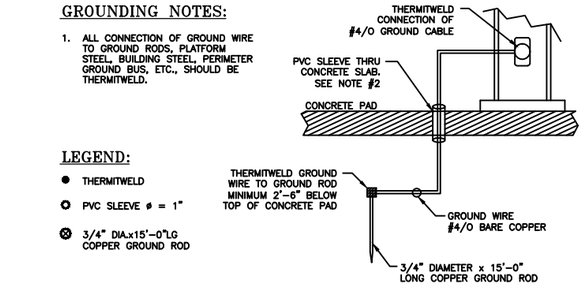
STACK SUPPORT
(2) PLACES
SCALE = 3"



RETHERM BASE PLATE
(10) PLACES
SCALE = 3"

GROUNDING NOTES:

1. ALL CONNECTION OF GROUND WIRE TO GROUND RODS, PLATFORM STEEL, BUILDING STEEL, PERIMETER GROUND BUS, ETC., SHOULD BE THERMITWELD.



LEGEND:
- ● THERMITWELD
- ○ PVC SLEEVE ø = 1"
- ⊗ 3/4" DIA.x15'-0"LG COPPER GROUND ROD

MOUNTING AND GROUNDING DETAIL OF EQUIPMENT SKID / STRUCTURAL STEEL, OR FAN BASE, OR EXHAUST STACK
NOT TO SCALE

NOTE:
THESE ARE GROUND RECOMMENDATIONS ONLY. ACTUAL GROUNDING DONE BY OTHERS.

PRELIMINARY

AMEC FOSTER WHEELER
KENTUCKY

REV	DESCRIPTION OF CHANGE	DATE	BY

	DATE	BY
DRN	11.22.16	BRR
CKD		
APPD		KK
SCALE:	NOTED	

DÜRR SYSTEMS, INC.
CLEAN TECHNOLOGY SYSTEMS
26801 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN

THE INFORMATION CONTAINED IN THESE DRAWINGS IS FURNISHED AT YOUR REQUEST AND IS ACCEPTED BY YOU WITH THE UNDERSTANDING THAT IT IS STRICTLY CONFIDENTIAL AND WILL NOT BE USED NOR DISCLOSED TO OTHERS WITHOUT OUR WRITTEN CONSENT.
DÜRR SYSTEMS, INC.

PROJECT – AMEC FOSTER WHEELER

TITLE
VOC EMISSION CONTROL
ABATEMENT SYSTEM
FOUNDATION LOADING

JOB NUMBER US04-83177
DURR DRAWING NUMBER C001 REV –
DURR STANDARD NUMBER –

ACAD PART NAME:

LEADING IN PRODUCTION EFFICIENCY

NEXT GENERATION RTO TECHNOLOGY
Ecopure RL - SINGLE VALVE THERMAL OXIDIZER

Advanced modular RTO system

What makes the **Ecopure** RL different?

The **Ecopure** RL is the most advanced regenerative thermal oxidizer (RTO) available. With a compact, rugged design, it offers the highest destruction efficiency and heat recovery of any RTO on the market.

This state-of-the-art design features a single rotary diverter valve and twelve heat recovery chambers enclosed in a single tower that arrives onsite in a pre-piped, pre-wired package that maximizes quality and minimizes field assembly.

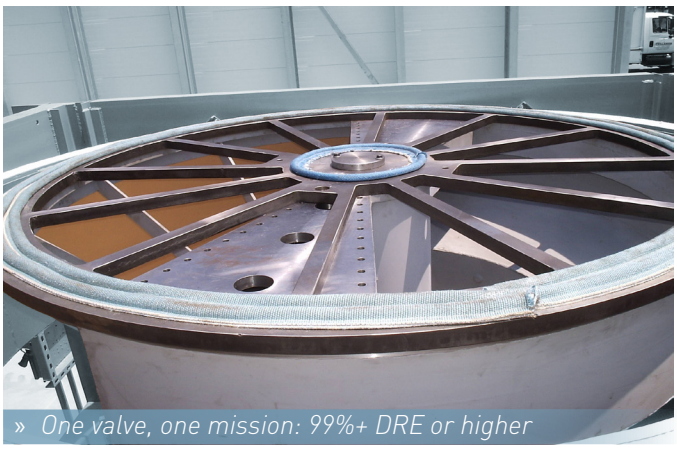
» *The **Ecopure** RL provides a modular, high performance, and cost efficient RTO system that fits in even the smallest footprints*

99%+ VOC removal is standard

The **Ecopure** RL provides the highest standard volatile organic compound (VOC) removal of any RTO available at 99%+. All RTOs use a combination of time, high temperature, and turbulence to destroy pollutants. Only the **Ecopure** RL does so with minimum moving parts.

The heart of the **Ecopure** RL is its simplicity. A single outlet diverter valve replaces all butterfly or poppet valves used in a conventional RTO.

This heavy-duty valve features machined, metal seats with a unique air seal that provides a 99%+ destruction of VOCs and HAPs. This ensures your plant will be compliant now and long into the future.



» *One valve, one mission: 99%+ DRE or higher*

*Scan to see a video of how the **Ecopure** RL operates*

COST EFFECTIVE ENGINEERING

Advantages that set the Ecopure RL apart

Performance, performance, performance. The **Ecopure** RL simply outperforms the competition.

- Standard 99%+ destruction efficiency - guaranteed
- Up to 95% thermal energy recovery
- Low pressure drop
- Particulate and condensable tolerant

Durable, low-maintenance design

If uptime is crucial and system downtime is unacceptable, the **Ecopure** RL is your only choice.

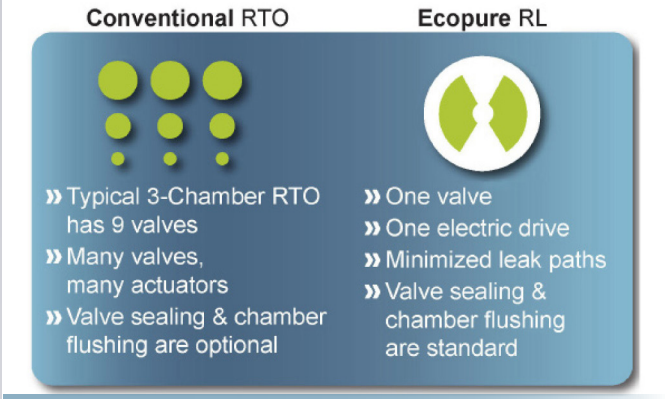
- Skid mounted design (pre-piped, pre-wired) makes for more cost effective install
- All drive components external to unit
- All fuel train components at grade
- Replaces multiple dampers used in conventional RTO
- Fewer moving parts, greater reliability
- Electric valve drive system replaces hydraulic and pneumatic drives found in typical RTOs
- Online bake-out option allows for removal of particulates, aerosols, and condesables without process interruption.

Diversity in industry

Dürr is your source for proven cost effective air emissions compliance solutions, with over 45 years of experience and 4,000 pollution control systems operating in a broad range of industries.

The **Ecopure** RL is available in pre-engineered sizes up to 100,000 SCFM+ per unit. The system is highly versatile and applicable in most industries and processes, including:

- Automotive & industrial painting
- Chemical & petrochemical
- Coating & printing
- Semiconductor
- Pharmaceutical
- Food processing & odor control
- Wood products
- Carbon fiber
- Biofuels and many more



» *Less valves, less maintenance, greater reliability*

» *Three 60,000 scfm **Ecopure** RL systems used for odor control at a pet food manufacturing facility in Kansas*

» *50,000 scfm **Ecopure** RL installed at a carbon fiber manufacturer in Washington.*

Subject to change. The information in this brochure contains only general descriptions or performance characteristics which may vary in actual cases. The requested performance parameters shall be binding only if they are explicitly agreed within the sales contract. © Dürr Systems, Inc.

General Terms and Conditions of Sale

Seller shall provide only the materials, equipment, and where applicable, the labor and services described in this Proposal in accordance with, and subject to, the following terms and conditions which are part of the Contract between Seller and Buyer and which are accepted by Buyer if Buyer either issues a purchase order covering the Work or otherwise authorizes the Seller to perform the Work.

No other material or equipment of any nature is included in the price stated in the Proposal. Buyer acknowledges it has inspected, examined, and studied all plans, specifications, prints, drawings, and material lists furnished by Seller and that it has approved the same, including, without limitation of the foregoing, Buyer's Scope of Work in connection therewith. For the purpose hereof, except as otherwise provided in this Proposal, Buyer's Scope of Work shall mean all site preparation, utility connections, etc., required for the installation of the equipment.

1. **Term of Proposal**. Unless otherwise provided, this Proposal is subject to acceptance by Buyer within thirty (30) days from the Proposal date.

2. **Delivery**. Unless otherwise provided, all shipments of materials and equipment shall be made by Seller Ex-works Origin. Title and risk of damage to or loss of goods shall pass to Buyer upon delivery of goods to carrier. No claim will be allowed unless made by Buyer within 7 days from receipt of shipment. This Contract is based on the current freight rates and the price is subject to adjustment in the event that a change in such rates affects Seller's cost of performance hereunder. Prices quoted are for furnishing and shipping complete, or in accordance with the delivery schedule specified, the quality or quantities listed for each item. Should shipping releases or schedules be changed for any reason beyond Seller's control, Seller reserves the right to invoice according to work performed by Seller through the date of any such change. If Buyer declines or is unable to take delivery at the time(s) specified in the Proposal or Contract, Seller will have the equipment stored for Buyer at Buyer's risk and account, and the materials shall be considered "delivered." Buyer shall pay storage, handling and re-handling charges and continue to make payments according to the payment terms contained herein.

3. **Installation**. If installation work is a part of this Contract, the equipment and/or machinery shall be assemble, erected and installed under the personal direction of an employee or agent of Seller. Buyer shall furnish sufficient electricity, water, compressed air, light, heat, sanitary facilities, and fire protection as well as adequate all-weather storage space, ingress and egress to the job site and other items that may be listed under Buyer's responsibilities. The site is to be prepared for installation personnel to work in a normal fashion with no extra equipment or procedures required due to construction or production interferences. Unless otherwise stated, installation shall be performed only during Seller's normal working hours and any overtime work required for any reason shall be requested by and paid for by Buyer.

4. **Site Access**. Unless otherwise provided, or waived in writing by Seller, the following will be available to Seller throughout the duration of the Work at no cost to Seller: A) A safety buffer zone shall be established nominally fifty (50) feet all around the base of Seller's work area, which will be maintained free and clear of all work, contractors, equipment and personnel; B) An adequate construction staging, lay down and material storage area for Seller's exclusive use shall be available adjacent to the safety buffer area. This area and the safety buffer shall be graded, leveled, well drained, and even with the top of the foundation and be suitable for delivery vehicles and Seller's equipment in all weather conditions; C) All weather access roads shall be made available and maintained by Buyer from a main highway and from the railroad sidings (if applicable) to Seller's area and the location of construction; and Seller's rail siding, (if applicable), shall be available to Seller within 300 feet, by the normal routing, of Seller's area.

5. **Licenses, Permits**. All building, erection or other licenses or permits necessary or related to the work, shall be secured and paid for by the Buyer.

6. **Changes and Differing Conditions**. A) If Buyer requests changes, or changes in site conditions or installation requirements occur subsequent to issuance of the Purchase Order, the parties shall renegotiate the price to reflect all expenses caused by the changes. B) Buyer, by written order accepted by Seller, may make reasonable changes in the scope of work subject to equitable adjustments in the Contract price and schedule, including an allowance for increased overhead and profit. Seller is not obligated to incur any expense or do any work in excess of that reasonably anticipated unless Buyer issues a written order for such expense and work with mutually acceptable terms and conditions. C) Seller reserves the right to make changes, subject to Buyer's approval, in design or material, which in Seller's judgment would improve the equipment and/or its operation. D) If Seller is installing equipment and any site conditions or installation requirements at the time of erection differ materially from those evident at the time of Seller's pre-bid site visit, Buyer's representations, and conditions ordinary to similar projects, then any additional costs caused by the differing site conditions or installation requirements shall be subject to equitable adjustment to the Contract price and schedule. E) If Seller's activities or operations at the site are interrupted by any party other than Seller, an equitable adjustment shall be made to the Contract price and schedule.

7. **Shipping, Delays, Suspension, Payment Acceleration**. All shipping dates are approximate, based on prompt receipt by Seller of all necessary information and are subject to change by reason of conditions beyond Seller's reasonable control as stated in Article 24. If a delay in shipment or installation is caused by Buyer or by any other cause beyond Seller's reasonable control, the portion of the Contract price already performed by Seller shall become due and payable within 30 days of shipment, or if not shipped, 30 days from the date the equipment is ready for shipment. If Buyer requires Seller to delay engineering, fabrication, shipment, installation, or start-up of the equipment and/or machinery under this Contract, Seller shall be entitled to full reimbursement for all costs incurred as a result of such delay. If Buyer suspends work on this Contract, Buyer shall reimburse Seller for all costs incurred by Seller as a result of such suspension. If the suspension exceeds 90 days, Seller shall also have the right to cancel the unfinished portion of the Contract without liability to Buyer of any kind and Seller will be paid according to Article 16.

8. **Other Contractors.** Seller has no duty or authority to direct, supervise or oversee any contractors of Buyer or to provide the means, methods or sequence of their work or to stop their work. Seller's services and/or presence at a site shall not relieve others of their responsibility to Buyer or to others. Seller shall not be liable for the failure of Buyer's contractors or others to fulfill their responsibilities, and Buyer agrees to indemnify, hold harmless and defend Seller against all claims arising out of such failures.

9. **Safety Devices**. Seller will supply such safety devices or fire protection equipment as is specified in the Proposal. If Buyer desires or requires through local, state, or insurance underwriter's specifications or regulations, other additional safety devices or equipment, Seller may elect to furnish same at Buyer's cost.

10. **OSHA – Federal, State & Local.** Seller will comply with the Federal OSHA requirements in effect as of the date of the Proposal relative to the Work. Seller's sole responsibility is limited to modification or replacement of the equipment cited as violating such standards. OSHA requirements with respect to noise are specifically excluded. Where state, local or Buyer's health and safety requirements differ from the Federal OSHA requirements, modifications or changes in design to meet such requirements will be incorporated at Buyer's request. Additional costs arising from such requests and from erection procedures required by state, local or Buyer's health and safety regulations which deviate from Federal OSHA requirements are for Buyer's account.

11. **Material/Workmanship Warranty (Applicable to Equipment, Systems, and Spare Parts Orders).** Seller warrants that all equipment it manufactures and furnishes and work provided will be free from defects in materials and workmanship for a period of twelve (12) months from the date Buyer is able to begin deriving commercial benefit from the work or eighteen (18) months from the date the first item is shipped, whichever occurs earlier. For equipment whose operation involves burners, commercial benefit is defined as the date of first burner ignition of the equipment. Seller's sole obligation is to repair or replace, at Seller's option, any part or component which, after Seller's inspection, proves to be defective, provided that Seller shall not be obligated for any removal, shipping or reinstallation costs. Seller will make repaired or replacement components available to Buyer in Seller's standard packaging, Ex-works Seller's shipping point. The warranty does not apply to consumable, replaceable parts or components normally subject to wear and replacement. Seller's obligations in this Article are subject to the following conditions: A) Receipt from Buyer of immediate written notice describing the defect in detail. B) Buyer shall not have attempted to correct the defect without Seller's approval. C) Buyer shall have installed (if applicable), operated and maintained the equipment strictly in accordance with Seller's operating and maintenance instructions, including, but not limited to, Seller's design basis or other design criteria stated in Seller's Proposal. D) The defect has been caused solely by faulty materials or workmanship for which Seller is responsible, and is not due to such things as erosion, corrosion, or deterioration resulting from the manner in which the equipment is operated, accident (including damage during shipment), neglect, misuse or abuse, or exposure to conditions beyond the environmental power or operating constraints specified by Seller.

To the extent that the materials and equipment furnished consist of products manufactured by other parties, such manufacturer's warranty is hereby assigned to Buyer, and Seller's responsibility with respect to any such products shall not extend beyond the manufacturer's warranty. It is understood that Seller's warranty with respect to such products is limited to repair or replacement at Seller's option and does not include labor, repair or replacement costs, or travel unless otherwise provided.

12. **Services Warranty (Applicable to Consulting, Design, Engineering, Inspection and Planning Orders).** A). Seller warrants that the services shall be performed in a competent and non-negligent manner. Within a period of twelve (12) months from completion of such services, Seller shall; at its cost, correctly re-perform any non-conforming services or, if such services cannot be re-performed, refund the amount paid for such non-conforming services. B). Seller warrants that any engineering and/or design work that it performs hereunder shall be performed in accordance with generally accepted trade or industry practice. Seller's liability for such warranty shall be fully satisfied by revision and resubmission of all calculations and drawings incorrectly completed as a consequence of breach of this warranty. C). Buyer expressly acknowledges and agrees that the foregoing warranties in this Article 12 are offered by Seller expressly contingent upon Buyer's strict compliance with Article 18, and further that any failure of Buyer to comply with the terms thereof shall be deemed as a breach of Buyer's obligations hereunder.

13. **Patent Warranty.** Seller shall defend, at its expense, any suit or proceeding brought against Buyer based on any claim that the equipment covered herein, except for equipment or material manufactured or designed to Buyer's specifications, infringes any U.S. patent issued as of the date of this Proposal, and pay any court imposed damages and costs finally awarded against Buyer, but not to exceed the amount previously paid to Seller by Buyer hereunder provided: A) Seller is promptly notified by Buyer in writing of such claim; and, B) Seller is given full authority, information, and assistance by Buyer which Seller deems necessary for the conduct of such defense. In order to avoid such claims and/or minimize potential liability, Seller shall have the right and option at any time to: A) procure for the Buyer the right to use the equipment; or B) modify the equipment so that it no longer infringes; or C) replace the equipment with non-infringing equipment.

14. **Performance Guarantee**. Seller's sole guarantees are those contained in its Proposal to Buyer. These guarantees are contingent upon the correctness and accuracy of the information provided by Buyer and are based upon the operating conditions specified in Seller's Proposal and operation and maintenance by properly trained personnel. These guarantees will be deemed satisfied by successful completion of performance tests in accordance with applicable standard procedures as specified in the proposal and in effect on the date of this proposal. Performance tests shall be conducted by the Buyer, (unless otherwise specified in Seller's Proposal), and witnessed by Seller, at its option, within 90 days of initial operation of the equipment. If the tests are not conducted within 90 days of the initial operation or within 6 months of shipment, whichever is earlier, and through no fault of Seller, the equipment shall be deemed accepted by the Buyer and in compliance with all contractual requirements. Seller makes no warranty whatsoever as to the inclusion of the equipment supplied by Seller into Buyer's manufacturing process, Seller's warranty being limited solely to the performance of its equipment in accordance with the applicable provisions in Seller's proposal. If the equipment fails to meet the Contract performance guarantees, Seller will supply at its sole option, repaired or replacement parts pursuant to the delivery terms of the Proposal subject to the limitations stated in Article 27.

15. **IMPLIED WARRANTIES/GUARANTEES DISCLAIMER. THE WARRANTIES AND GUARANTEES FURNISHED BY SELLER, AS EXPRESSLY INCLUDED HEREIN, CONSTITUTE THE SELLER'S SOLE OBLIGATION HEREUNDER AND ARE IN LIEU OF ANY OTHER WARRANTIES OR GUARANTEES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

16. **Cancellations**. If Buyer cancels for any reason at any time after Seller has received a purchase order (or other authorization) for any equipment, parts, or services or any combination thereof, Buyer shall pay to Seller within 30 days of such cancellation, all contract costs and other expenses incurred by Seller prior to receipt of the request for cancellation (including, but not limited to, engineering expenses, and overhead, costs of expended materials, direct labor with factory burden, and all commitments to Seller's suppliers, subcontractors and others), plus cancellation charges of 20% of the Contract price to cover general and administrative expenses plus 10% of the Contract price to cover profit lost by reason of cancellation. If Buyer materially breaches any obligation, then Seller may cancel the unfinished portion of the Contract without liability of any kind to Buyer. In any such case the terms of this Article 16 shall apply.

17. **Bonds.** If Seller agrees in writing to furnish any bond or bonds on account of the execution or fulfillment of this Contract, then the cost will be added to the quoted price. The penal sum of any bond or bonds furnished by the Seller in connection with this Contract shall be automatically reduced to 5% of the initial Contract value upon the date Buyer is able to begin deriving benefit from the work or 3 months after the date Seller notifies Buyer of its readiness to ship equipment, whichever occurs earlier. Buyer agrees to execute any acknowledgement or furnish documents required to effect this reduction.

18. **Credit and Payment**. A) Unless otherwise agreed, payment shall be as outlined in the Proposal and payments shall be made in current funds of the U.S. at par within 30 days of presentation of an invoice.

General Terms and Conditions of Sale

Payments not received by the due date shall be subject to a monthly interest charge at the rate of 2% per month or the maximum amount allowed by law, whichever is less, due and payable until the payment is received. B) Buyer shall also pay all collection costs of Seller on any delinquent amounts including, but not limited to, court costs and attorney fees. Seller will assess Buyer's financial condition and Seller shall have the absolute right to (i) limit the amount of credit that Seller may extend to Buyer for the purpose of goods hereunder, and delay manufacture or shipment of Buyer's orders based upon those limitations; (ii) require full or partial payment in advance; (iii) ship goods to Buyer C.O.D., require payment by irrevocable confirmed letter of credit, or require payment to be secured by letters of credit; (iv) require written guarantees of payment satisfactory to Seller; or (v) cancel or refuse to accept or fill any order from Buyer then outstanding or thereafter placed, all on terms satisfactory to Seller, in its sole and absolute discretion.

18.1 **Default in Payment**. A) If any payment due Seller is more than 30 days past due, Seller shall have the right at its sole option to accelerate the payment of all outstanding amounts, including, but not limited to, amounts previously retained pursuant to the Contract, by notifying Buyer in writing that all outstanding amounts are immediately due and presenting Buyer with an invoice. Seller shall also have the right in such event to discontinue all work on the project without incurring any liability to Buyer for such action; B) If the total aggregate amount of delinquent payments exceeds 10% of the total Contract price, Buyer shall provide, at Seller's request, additional collateral, including, but not limited to, irrevocable letters of credit, sufficient to secure payment of all Contract amounts; C) The foregoing remedies of Seller are in addition to all other remedies Seller may have at law or in equity, including, but not limited to, the right to obtain liens on Buyer's assets through legal or equitable proceedings.

18.2 **Security Agreements**. A) Buyer hereby grants to Seller a security interest in the equipment or materials sold hereunder to secure the purchase price of same. Buyer shall execute any financing or other statements or filings which in Seller's sole judgment are necessary or appropriate to evidence or perfect such security interest, which shall thereafter be filed by Buyer with the appropriate recording officer. This Contract shall constitute the security agreement between the parties and is intended to and shall afford the Seller all rights of a secured party under Article 9 of the Uniform Commercial Code; B) Until Buyer has paid the full amount due and owing for any equipment or materials purchased hereunder, Buyer shall be prohibited from transferring such equipment or materials to any creditor of Buyer other than Seller, unless Seller provides its prior written consent to such transfer, such consent not to be unreasonably withheld; C) If Buyer becomes insolvent, files for Bankruptcy, or goes into receivership or liquidation, Buyer agrees to use its best efforts and to provide all assistance requested by Seller in order to secure Seller's position as a preferred creditor with respect to all amounts due to Seller.

18.3 **Payment of Retained Amounts**. A) If this Contract permits Buyer to withhold final payment, and acceptance is not based upon performance tests, such payments shall be due and payable within 30 days after the equipment is ready for operation; B) If such deferred payment is contingent upon tests and such tests are delayed through no fault of Seller for more than 30 days after the equipment is first ready for operation, final payment shall be due and payable upon expiration of the 30 day period; C) If a retention value is required and agreed, it shall accrue interest at the rate of 1% per month on the outstanding balance until exchanged for a letter of credit or paid to Seller. Seller retains the right to provide Buyer with a letter of credit in lieu of retention at any time during the performance of the contract.

18.4 **International Project Payment Requirements**. If this Contract involves shipment of Seller's goods outside the U.S.A. the following payment terms apply, unless otherwise provided in Seller's Proposal: 1) Down Payment - EFT: The initial down payment will be made by EFT within 10 days after Seller issues an invoice and formal order acknowledgement letter to Buyer. 2) Other Payments- Commercial Letter of Credit: Balance of Contract price will be paid by Irrevocable Letter of Credit (L/C) issued within in USD by a Prime Bank within 30 days after Seller's issuance of its formal acknowledgement letter and covering the following payments:

a. Shipping Payment: L/C will allow a payment at sight against Seller's shipping documents (invoice, packing list and bill of lading/airway bill) presented to Seller's bank. Unless otherwise specified in Seller's proposal, the combined value of this payment and the initial down payment will equal 95% of the Contract price.
b. Final Retention Payment: (if applicable) will be due upon the earlier of, either 1) acceptance certificate, or 2) 180 days after date of bill of lading corresponding to last major shipment.

L/C General Requirements: A) The L/C will be issued on terms acceptable to Seller (generally described in this Article 18.4), and advised and confirmed by Seller's Bank. B) L/C will allow not less than 21 days after issuance of 3rd party transport documents for presentation of Seller's documents. C) L/C will expire in USA no earlier than 30 days after Seller's last shipment under the contract. D) L/C will allow partial and transshipments by ocean or air. E) L/C will be freely negotiable in USA with reimbursement instructions and authorizing reimbursement via SWIFT/TELEX. F) All banking charges for Buyer's account.

19. **Escalation**. Buyer will adjust the Contract price and pay Seller for: A) costs Seller has or may incur that were not anticipated by Seller as of the date of the initial Proposal or, B) the Contract exceeds the time frame contemplated by the parties.

20. **Taxes and Duties.** Unless otherwise provided, any tax or import duty imposed by any federal, state, local or municipal Authority arising out of the sale, manufacture or installation of the equipment or performance covered by this Contract, is not included in the price as quoted in the Proposal, and Buyer is responsible for any such amount(s).

21. **Proprietary & Confidential Materials**. All information supplied by Seller as to design, manufacture, erection, operation and maintenance of the equipment, including all drawings, patterns, specifications and information in Seller's Proposal or Contract, shall be the proprietary and confidential property of Seller and shall be returned to Seller at its request. Buyer shall have no rights in Seller's proprietary and confidential property and shall not disclose such to others or allow others to use such property, except as required for the Buyer to obtain service, maintenance, and installation for the equipment purchased from the Seller. Specifically, Buyer agrees that no drawings, specifications or information included in Seller's Proposal or Contract shall be used by Buyer for competitive bidding or similar purposes without Seller's consent and Buyer shall not reproduce or build assemblies or process systems per Seller's design drawings without explicit approval of Seller; B) Buyer shall hold in confidence and shall not disclose, divulge or publish to any person, or use or copy any trade secret, process, record, plan, projection, information pertaining to customers or prospective customers, financial information, marketing strategies, or any other confidential or proprietary information of Seller (including the terms and conditions of this Contract or any other agreement between Buyer or Seller) acquired or in connection herewith, or disclosed or transmitted by Seller or any of its agents, employees, or affiliates, except as authorized in writing by Seller, and Buyer shall keep, and shall require its officers, directors, employees, and agents to keep such information confidential; C) This clause shall survive the termination of this Contract and be in effect as long as Buyer has possession of any of Seller's proprietary or confidential information.

22. **Hazardous Materials**. If the Buyer's facilities contain hazardous materials, including asbestos bearing materials and any such materials are encountered, Seller shall have no obligation to remove or remediate them in the absence of a separate agreement which includes separate consideration to Seller for such work. If Seller or any of its subcontractors is required to perform work within or immediately adjacent to any facilities that are determined to contain hazardous material and/or asbestos, and the said work must be interrupted to allow for the remediation or removal of such materials by others, Seller shall be entitled to any and all costs and other expenses associated with such interruption in work. Buyer shall fully defend, hold harmless and indemnify Seller and its agents from and against any claim arising out of exposure to such hazardous and/or asbestos bearing materials.

23. **Health and Safety**. Seller shall not be responsible for health or safety programs or precautions related to Buyer's activities or operations, Buyer's other contractors, the work of any other person or entity, or Buyer's site conditions. Seller shall not be responsible for inspecting, observing, reporting or correcting health and safety conditions or deficiencies of Buyer or others at Buyer's site, and Buyer agrees to indemnify, hold harmless and defend Seller against any claims arising out of such conditions or deficiencies. So as not to discourage Seller from voluntarily addressing health or safety issues while at Buyer's site, in the event Seller does not address such issues by making observations, reports, suggestions or otherwise, it is understood and agreed that Seller shall nevertheless have no liability or responsibility arising on account thereof.

24. **Delays and Damages – Force Majeure**. A) In the event of delays in the performance of the obligations hereunder or damages due to conditions beyond Seller's reasonable control, including, but not limited to acts of God, acts of Buyer, or Buyer's customer or other contractors employed by Buyer, acts of civil or military authority, governmental restrictions, prohibitions and regulations, priorities, fire, storms, strikes, floods, epidemics, quarantine restrictions, war, riot, delays in transportation, car shortages, or Buyer's inability to obtain necessary labor, materials, or manufacturing facilities, the Contract dates shall be extended by an equitable period of time and Seller shall be entitled to an equitable adjustment in the Contract price. B) Acceptance of the equipment by Buyer shall constitute a waiver of all claims for damages. C) Seller's shipping dates are approximate. Seller's performance is predicated on certain performance of Buyer and Seller is not responsible for loss or damage arising from delays caused by Buyer's inability to act, failure to perform, or failure to provide complete and/or accurate information. D) This Section shall in no event be construed to relieve Buyer from the obligation to pay for goods shipped by Seller.

25. **Disclaimer of Consequential Damages.** Seller, it's subsidiaries, affiliates, agents, or employees shall not be liable to Buyer for incidental, indirect, special, liquidated or consequential damages, including, but not limited to, loss of profits or revenue, loss of use of equipment, costs of replacement or substitute goods or product, costs of capital, additional expenses incurred in the use of equipment or facilities, or claims of third parties. This disclaimer shall apply to consequential damages based upon any cause of action whatsoever asserted against Seller, including one arising out of any breach of warranty, express or implied; guarantee; products liability; negligence; tort; or any other theory of liability.

26. **Indemnification by Buyer**. Buyer shall indemnify Seller for, and hold Seller harmless from, all costs and expenses incurred by Seller, including, without limitation, costs of investigation, attorney's fees, and amounts paid in settlement or satisfaction of claims, proceedings or judgments in connection with all claims and proceedings against Seller based upon claimed defects in design in any equipment or material manufactured for Buyer by Seller to Buyer's specifications or design.

27. **Limitation of Liability.** Seller's liability for any and all claims, including property damage and personal injury claims, allegedly resulting from breach of contract, tort, or any other theory of liability shall not exceed either A) the amount of the initial purchase price paid to Seller by Buyer in contracts up to one million USD in value, or B) 25% of the total contract price in contracts greater than one million but less than fifty million USD in value. Seller's liability for property damage and personal injury is limited to the amount indicated on Seller's insurance certificate issued by Seller for this contract.

28. **Buyer's Negligence and Insurance**. Seller shall not be responsible for losses or damages arising out of the negligence of the Buyer, its employees, agents or architects or those of third parties for whom Seller is not responsible, or losses for which the Buyer has agreed to provide insurance. If both Seller and Buyer are negligent and the negligence of both is the proximate cause of the accident, then each party will be responsible for its portion of the liability or damages (excluding consequential or indirect damages which are disclaimed by Seller) resulting therefrom equal to such party's comparative share of the total negligence.

29. **Severability.** Should any part of this Contract be declared invalid or unenforceable, such decision shall not affect the validity of any remaining portion, which remaining portion shall remain in full force and effect, and Seller shall have the right to replace the part declared invalid or unenforceable with a provision which serves as much as validly possible the same commercial purpose as the part determined to be invalid or unenforceable.

30. **Assignment/Subcontracts**. This Contract shall be binding upon and inure to the benefit of the parties, their successors, and assigns provided that Buyer may not assign the Contract without prior written consent of Seller. Seller may subcontract any portion of the work.

31. **Disputes.** If a dispute arises hereunder, the parties will confer and attempt to amicably resolve the dispute. If after good faith negotiation, the parties cannot reach agreement, then the matter will be finally resolved in any court having jurisdiction and venue located within the County of Oakland, State of Michigan or the U.S. District Court for the Eastern District of Michigan.

32. **Entire Agreement, Contract Interpretation, Governing Law**. All communications, written and verbal, between the parties with reference to the subject of this Contract prior to the date of acceptance are merged herein, and this Proposal, when duly accepted and approved, shall constitute the sole and entire agreement and Contract between the parties. No change in or modifications of said Contract shall be binding upon the parties or either of them, unless the changes or modifications shall be duly accepted in writing by both parties. Unless Seller expressly agrees to the contrary in writing, these General Terms and Conditions of Sale (including statements made in the Proposal) shall govern any conflict with any in Buyer's documents. Any contract resulting from this Proposal shall be construed, governed and enforced in accordance with the laws of the State of Michigan, exclusive of the choice of law rules thereof. The U.N. Convention on Contracts for the International Sale of Goods shall not apply to this Contract.

1.0 DÜRR SYSTEMS, INC. FIELD SERVICE RATES

1.1 Term of Proposal: Unless otherwise provided, this Proposal is subject to acceptance by Buyer within thirty (30) days from the Proposal date.

1.2 Domestic:

a. From the hour the Seller's representative leaves the basing point and including the hour of Seller's representative's return to its basing point, payment shall be made by Buyer to Seller at the rates listed below.

b. A workday is defined as any day, Monday through Friday, whether actual work is performed or not. Also, any travel time to or from the base point is considered a workday and payment shall made in accordance with the applicable workday rates defined herein.

		US, Canada Mexico Rates	International Rates
Field Labor	Straight Time	$110/hr.	$137.50/hr.
	Overtime	$135/hr.	$168.75/hr.
	Sun/Holiday	$165/hr.	$206.25/hr.
	Travel Time	$110/hr.	$112.50/hr.
Field Service	Straight Time	$120/hr.	$150.00/hr.
	Overtime	$150/hr.	$187.50/hr.
	Sun/Holiday	$180/hr.	$225.00/hr.
	Travel Time	$120/hr.	$125.00/hr.
Engineer	Straight Time	$145/hr.	$168.75/hr.
	Overtime	$175/hr.	$218.75/hr.
	Sun/Holiday	$210/hr.	$262.50/hr.
	Travel Time	$145/hr.	$168.75/hr.
Sr. Engineer / Project Manager	Straight Time	$160/hr.	$187.50/hr.
	Overtime	$195/hr.	$243.75/hr.
	Sun/Holiday	$225/hr.	$281.25/hr.
	Travel Time	$160/hr.	$187.50/hr.
Modem Support		$150/hr.**	$150/hr.**

** Billed in ¼ hour segments, with 1 hour minimum, unused portion credited against future support.

The minimum workday charge will be based on a full eight (8) hour day.

Mileage charges for the usage of ***personal vehicles will be billed at $.67 per mile*** from the representative's basing point.

2.0 EXPENSES

2.1 Transportation

Travel by air will be Coach Class for US, Canada and Mexico, Business Class for International. Round trip transportation to and from the job site location will be billed at cost plus a ten percent (10%) processing fee.

2.2 Room, Board and Local Transportation

Meals, living expenses, such as lodging, laundry, etc., and local car/equipment rental will be billed at cost plus a ten (10) % percent processing fee.

2.3 Subcontractor Charges

Charges from Seller's subcontractors will be billed at cost plus a fifteen percent (15%) processing and administration fee.

COMPANY CONFIDENTIAL - TRADE SECRET AND PROPRIETARY INFORMATION OF DÜRR SYSTEMS, INC.

3.0 MISCELLANEOUS

3.1 Rate Adjustments

Unless otherwise agreed, rates will be paid as set forth in this Proposal and may be adjusted to those in effect at the time the service is performed. **The listed rates are available only for calculating additional labor cost. These rates are not to be used for calculating deducts of labor cost without the expressed written consent of Dürr Systems, Inc.**

3.2 Lay-Over Expense

Where circumstances require that a service representative be held over on weekends during which no work is performed, charges will be made for eight (8) hours per day at the straight time rate and living expenses will be billed per Section 2.

3.3 Cancellation

In the event the Buyer should cancel a service requirement less than five (5) business days in advance of a previously agreed upon start date, a cancellation fee of one (1) day's service will be charged per Section 1 above.

3.4 Reporting/Engineering Services Charges

Standard reports may be issued for all field service visits, whether completed on-site or after departure from site. Appropriate report writing time will be invoiced accordingly.

Unless otherwise provided, all engineering services or other work performed by the Seller at its basing point or its offices, including report research and/or writing will be billed at $135 or $150 per hour per Section 1.1 above.

COMPANY CONFIDENTIAL - TRADE SECRET AND PROPRIETARY INFORMATION OF DÜRR SYSTEMS, INC.

Appendix M
Coating Permits – Similar Operations

ADEQ
MINOR SOURCE
AIR PERMIT

Permit No. : 209-AR-9

IS ISSUED TO:

NIBCO, Inc - Blytheville Division
4059 Highway 18 East
Blytheville, AR 72315
Mississippi County
AFIN: 47-00009

THIS PERMIT IS THE ABOVE REFERENCED PERMITTEE'S AUTHORITY TO CONSTRUCT, MODIFY, OPERATE, AND/OR MAINTAIN THE EQUIPMENT AND/OR FACILITY IN THE MANNER AS SET FORTH IN THE DEPARTMENT'S MINOR SOURCE AIR PERMIT AND THE APPLICATION. THIS PERMIT IS ISSUED PURSUANT TO THE PROVISIONS OF THE ARKANSAS WATER AND AIR POLLUTION CONTROL ACT (ARK. CODE ANN. SEC. 8-4-101 *ET SEQ.*) AND THE REGULATIONS PROMULGATED THEREUNDER, AND IS SUBJECT TO ALL LIMITS AND CONDITIONS CONTAINED HEREIN.

Signed:

Mike Bates
Chief, Air Division

Date

NIBCO, Inc - Blytheville Division
Permit #: 209-AR-9
AFIN: 47-00009

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List of Acronyms and Abbreviations

A.C.A.	Arkansas Code Annotated
AFIN	ADEQ Facility Identification Number
CFR	Code of Federal Regulations
CO	Carbon Monoxide
HAP	Hazardous Air Pollutant
lb/hr	Pound Per Hour
No.	Number
NO_x	Nitrogen Oxide
PM	Particulate Matter
PM_{10}	Particulate Matter Smaller Than Ten Microns
SO2	Sulfur Dioxide
Tpy	Tons Per Year
UTM	Universal Transverse Mercator
VOC	Volatile Organic Compound

Section I: FACILITY INFORMATION

PERMITTEE:	NIBCO, Inc - Blytheville Division
AFIN:	47-00009
PERMIT NUMBER:	209-AR-9
FACILITY ADDRESS:	4059 Highway 18 East Blytheville, AR 72315
MAILING ADDRESS:	4059 Highway 18 East Blytheville, AR 72315
COUNTY:	Mississippi
CONTACT POSITION:	Mr. Freddy Gentry
TELEPHONE NUMBER:	(870) 763-7044
REVIEWING ENGINEER:	Shawn Hutchings
UTM North South (Y):	Zone 16: 3978.80
UTM East West (X):	Zone 16: 242.10

Section II: INTRODUCTION

NIBCO, Inc., Blytheville facility manufactures cast iron valves using grey and ductile iron produced from scrap iron and steel. Operations are housed in several buildings. The two main buildings are designated as Building 27 and Building 28. The operations at this facility include foundry, machining and assembly operations, painting and surface coating, storage, and shipping.

Summary of Permit Activity

This permit adds a new burn-off oven to replace NIBCO's old burn off oven, SN-21. The new oven is rated at 3.0 BTU/hr and will be given the same source number.

Process Description

Foundry operations start with the production of cores and molds. The cores and molds are an integral part of the valve manufacturing business in that they provide the basic framework upon which the valve is manufactured. Cores are the portions of foundry molds that shape the interior of a hollow casting. The cores are made from new silica sand using resins and binder materials, among which are phenolic resins, polymeric isocyanate, catalysts, and other resins to solidify sand into cores.

There are several types of binder catalyst combinations. NIBCO operates five core machines which use iso-cure (phenolic urethane cold box) system. Four of the core machines are exhausted through a scrubber, SN-29. This permit covers the conversion of the fifth core machine, Sinto Core Machine, from an ester-cured phenolic cold box to a phenolic urethane cold box resin based system. In addition to the chemical change, a scrubber will be added to control emissions.

A mold is a frame inside which the valve is cast, or a cavity in which the valve takes its form. Most molds are made using the green sand process. Green sand is made from combining silica sand with a premix containing natural clay, sea coal, and water. Some molds are made using a no-bake process. The cores are placed inside the molds, sometimes with the aid of chaplets that help to prevent deformation of the casting depending on the size of the valve. Some of the castings which are manufactured do not facilitate the use of cores.

The next part of the process can be referred to as the melting process. This involves taking scrap steel, pig iron, and several alloying materials, such as ferric sulfate and ferrosilicon magnesium, and melting them in one of the four electric coreless induction furnaces. The scrap steel must be preheated to eliminate any moisture prior to being placed into the furnace. The molten metal (grey iron) is poured into the preheated ladles, transferred via a monorail system controlled by foundry personnel, and then poured into the molds. To smooth operations, molten metal can be held in the 20 ton capacity BBC holding furnace. Approximately two thirds of gray iron is converted into ductile iron (inoculated) to meet customers' specifications on ready products.

Inoculation, also called magnesium treatment, is conducted by introducing certain allowing elements (primarily magnesium) into the molten iron. Other (non-ductile) inoculants may be introduced into the furnace or ladles for metal chemistry purposes.

Casting pouring, cooling, and shakeout operations are conducted at one of three pouring lines. Once the poured molds are cooled, shakeout operations remove the core and mold sands from the cast valve. The used sand from both the molds and the cores is screened and recycled through a conveyor system where new additives are added to produce green sand for new moldings. Gates and runners are the solidified paths created during the pouring process. They are removed from the ready castings and returned to the scrap area for remelting. Returned metal, including bad castings, comprises 50-55% by weight of the metal poured.

The final process, which occurs before the castings go to the machining and ancillary operations, is shot blasting and grinding. Shot blasting uses steel shot as an abrasive to remove adhering sand and cosmetically clean the surface of the cast valve. Grinding removes excess flanges, gates, and runners which remain.

Machining operations bring the valves to company specifications in order to meet company quality control requirements. The machining operations are performed by automated machining lines and manual machines such as lathes, drill presses, mills, and custom built machining centers. Other operations include heat treating the ductile iron products. Heating the products is done to increase the machinability of the castings.

The process flow within building 28 is a set of smaller operations that includes the main shipping and receiving department, the rubber molding operation, and ancillary processes. In the rubber molding operations, butterfly castings are placed in a shot blaster where they are cleaned. The particulate emissions from the shot blasting operations are controlled by a fabric filter. A bonding agent is then applied to the inner rim of the casting. This bonding agent enables the rubber to adhere to the iron. The castings are then transferred to the rubber mold area. The castings are preheated and placed into the rubber molding machine. If the rubber mold coating does not meet quality requirements, the valve is sent to the burn-off oven. Castings leaving the burn-off area then reenter the molding operation.

Ancillary processes are comprised of machining, painting, assembly, testing and shipping of the finished products. NIBCO also paints some valves. The surface coating operations are conducted in two paint booths located in Building 28. Additional coating operations, powder coating and dip painting are located in a separate building.

Regulations

The following table contains the regulations applicable to this permit.

Regulations
Arkansas Air Pollution Control Code, Regulation 18, effective February 15, 1999

Regulations of the Arkansas Plan of Implementation for Air Pollution Control, Regulation 19, effective December 19, 2004

The following table is a summary of emissions from the facility. This table, in itself, is not an enforceable condition of the permit.

Total Allowable Emissions

TOTAL ALLOWABLE EMISSIONS		
Pollutant	Emission Rates	
	lb/hr	tpy
PM	37.6	81.7
PM10	37	80.9
SO2	0.6	0.6
VOC	129.3	80
CO	63.3	70.1
NOx	1.7	6.6
Lead	0.071	0.08
Benzene*	2.7	2.8
Formaldehyde*	0.1	0.1
Naphthalene*	0.14	0.15
Toluene*	1.3	1.4
1-methylnaphthalene*	0.05	0.05
Acetaldehyde*	0.12	0.12
Ethylbenzene*	3.04	0.75
Cumeme*	0.04	0.04
Propanol*	0.03	0.03
Xylene*	13.6	3.6
Cresol*	0.08	0.08
Phenol*	0.28	0.28
Styrene*	0.07	0.07
Polycyclic Organic Matter*	0.15	0.07
Manganese*	0.05	0.05
Hexane*	8.8	2.2
Methanol*	13.6	1.5
Triethyl Amine*	0.4	0.1
Other HAPs (non specific) *	51	10

Section III: PERMIT HISTORY

Permit 209-A was issued to NIBCO of Blytheville on January 25, 1974. This was the initial permit for the facility.

Permit 209-A(Modification) was issued to NIBCO on January 29, 1975. This modification allowed for the addition of a rotoclone to replace two filters and the addition of two small filters on the sand silos.

Permit 209-AR-1 was issued to NIBCO, Inc. on May 10, 1986. This modification allowed for the installation of a sand cooling system controlled by a cyclone. This is the first permit issued to the facility after Secondary Metal Production facilities were added to the source category list. The facility is still not a PSD major source because its foundry emissions are below the 100 TPY threshold.

Permit 209-AR-2 was issued to NIBCO, Inc. on March 4, 1993. This permit added several sources. These new sources were numbered SN-10 through SN-22. With the addition of these sources the potential emissions from foundry operations at NIBCO are now over 100 tpy and NIBCO is now a PSD major facility.

Permit 209-AR-3 was issued to NIBCO, Inc. on November 18, 1993. This permit modified SN-22 to include three burners. This additional source was not associated with the foundry operations at the facility.

Permit 209-AR-4 was issued to NIBCO, Inc. on September 30, 1994. This permit revised the emissions for VOC at the facility. Although PM_{10} emissions at the facility increased more than the 15 tpy significance level, there were no physical modifications to the facility. The emission increase was from changes in emission factors and hour of operation changes. These changes would not be defined as a modification under PSD regulations.

Permit 209-AR-5 was issued to NIBCO, Inc. on October 4, 1995. This permit added sources SN-23 through SN-28. These sources were not associated with foundry operations at the facility.

Permit 209-AR-6 was issued to NIBCO, Inc. on July 15, 1996. This permit added a core machine, (SN-29), and a shot blast machine, (SN-30). The total potential to emit for these two sources is 1.6 tpy of PM_{10}.

Permit 209-AR-7 was issued to NIBCO, Inc on June 14, 2002. This permit was to be the initial Title V permit for the facility. However, NIBCO submitted a revised application which had emissions which were lower than the Title V thresholds. The facility made several changes which are covered by this permit. The first change was removing the wet dust collectors and installing a baghouse, SN-01, to control particulate emissions from the foundry operations. The facility also installed a powder coating operation, SN-14, and changed chemicals in their Sinto Core Machine and added a scrubber, SN-32, to control its emissions.

NIBCO, Inc - Blytheville Division
Permit #: 209-AR-9
AFIN: 47-00009

Permit 209-AR-8 was issued on April 8, 2004. This permit makes changes to resolve the appeal issues. In this permit HAP flexibility was added for sources SN-13, 14, and 16. Testing requirements for SN-07, 08, and 10 were removed. The facility recalculated the emissions by removing a building collection efficiency and provided better documentation for the basis for the emission factors. Therefore, testing these sources was not necessary to show compliance. The pound per gallon VOC limit for SN-13 was corrected from 4.81 to 4.92. The emission limits for SN-25 were corrected. More specific language was added as to which requirements applied to SN-29, SN-29a and SN-30. And, the roadways and parking areas were added as insignificant activities.

The NIBCO facility is a valve manufacturing facility. However, the facility includes an iron foundry which is a PSD source category. The facility in previous permits was a major source for PSD since the iron foundry is a category source and emissions from the foundry operations of the facility were greater than 100 tpy for PM_{10}. Previous permits and permit applications stated incorrectly that the facility was not a category source. Therefore, all emissions associated with the foundry are subject to the 100 tpy PSD threshold. The remainder of the facility's emissions including foundry emissions is subject to the 250 tpy PSD threshold for non-category sources. This permit will include federal limits for NIBCO's emissions and thus making them no longer a major source under PSD or Title V.

Section IV: EMISSION UNIT INFORMATION

Specific Conditions

1. The permittee shall not exceed the emission rates set forth in the following table. [Regulation 19, §19.501 et seq., effective December 19, 2004 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

SN	Description	Pollutant	lb/hr	tpy
01	Charge Preheat, Metal Inoculation, Casting Shakeout, & Sand Handling and Cooling Baghouse	PM_{10} VOC CO	5.6 14.4 11.9	24.4 15.1 12.5
03	Casting Shot Blast and Grinding Baghouse	PM_{10}	5.2	22.6
04	Sand Silo with Baghouse	PM_{10}	0.1	0.3
04a	Baghouse Dust Silo	PM_{10}	0.1	0.3
05	Bond Silo with Baghouse	PM_{10}	0.1	0.3
06a	Iron Scrap Handling and Preheater	PM_{10} VOC NO_x CO	0.1 0.1 0.6 0.5	0.2 0.2 2.4 2.0
07	Induction Melting and Holding Furnaces	PM_{10} VOC CO Lead	11.5 0.4 1.7 0.07	12.1 0.4 1.8 0.07
08	Hunter Mold, Pour Off, & Cooling Ventilation	PM_{10} SO_2 VOC NO_x CO	2.4 0.1 0.8 0.1 14.4	2.5 0.1 0.8 0.1 15.1
10	BMM Molding, Pour-Off, & Cooling Gen. Ventilation	PM_{10} SO_2 VOC NO_x CO	5.6 0.2 1.7 0.1 33.6	5.9 0.2 1.8 0.1 35.2
11	Cleaning Room General Ventilation	PM_{10}	2.1	2.2
12	Casting Shakeout & Sand Hauling Areas General Ventilation	PM_{10} VOC CO	0.5 0.2 0.2	0.6 0.2 0.2

SN	Description	Pollutant	lb/hr	tpy
13	Spray Paint Booth	PM_{10} VOC	0.7 23.6	0.5 18.0
14	Powder Coating Operations	PM_{10} VOC NO_x CO	0.1 15.8 0.1 0.1	0.1 5.2 0.3 0.2
15	Heat Treat Furnace	PM_{10} SO_2 VOC CO NO_x lead	0.1 0.1 0.1 0.4 0.5 0.001	0.2 0.1 0.2 1.8 2.1 0.01
16	Spray Paint Booth	PM_{10} VOC	1.0 31.6	0.2 7.7
17	Rubber Mold Post Cure Oven	PM_{10} SO_2 VOC CO NO_x	0.1 0.1 0.1 0.1 0.1	0.1 0.1 0.1 0.2 0.2
18	Shot Blasting Operations Baghouse	PM_{10}	0.4	1.7
19	Disk Preparation Operations Baghouse	PM_{10}	0.3	1.2
21	Burn-Off Oven	PM_{10} SO_2 VOC CO NO_x	0.1 0.1 5.6 0.3 0.3	0.1 0.1 13.9 1.1 1.4
25	Rubber Mold Coating Operations	VOC	16.2	12.2
26	Liquid Solvent Degreasing	VOC	0.6	0.1
27	Grinding, Machining, and Tooling Baghouse	PM_{10}	0.4	1.4
29	Isocure Core Room Scrubber	PM_{10} VOC	0.2 12.0	0.2 2.1
32	Sinto Core Machine			
29a	PUNB Core-Making	VOC	5.7	2.0
30	Shot Blasting Operation Baghouse	PM_{10}	0.3	1.2
31	Pattern Shop and Core Storage	VOC	0.4	1.7

2. The permittee shall not exceed the emission rates set forth in the following table. [Regulation 18, §18.801, effective February 15, 1999, and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

SN	Description	Pollutant	lb/hr	tpy
01	Charge Preheat, Metal Inoculation, Casting Shakeout, & Sand Handling and Cooling	PM Benzene Formaldehyde Naphthalene Toluene 1-methylnaphthalene Acetaldehyde Ethylbenzene Cumeme Propanol Xylene Cresol Phenol Styrene Polycyclic Organic Matter	5.6 2.7 0.1 0.14 1.3 0.05 0.12 0.14 0.04 0.03 1.0 0.08 0.28 0.07 0.15	24.4 2.8 0.1 0.15 1.4 0.05 0.12 0.15 0.04 0.03 1.0 0.08 0.28 0.07 0.07
03	Casting Shot Blast and Grinding	PM	5.2	22.6
04	Sand Silo with Baghouse	PM	0.1	0.3
04a	Baghouse Dust Silo	PM	0.1	0.3
05	Bond Silo with Baghouse	PM	0.1	0.3
06a	Iron Scrap Handling and Preheater	PM	0.1	0.3
07	Induction Melting and Holding Furnaces	PM Manganese	11.5 0.05	12.1 0.05
08	Hunter Mold, Pour Off, & Cooling Ventilation	PM	2.4	2.5
10	BMM Molding, Pour-Off, & Cooling Gen. Ventilation	PM	5.6	5.9
11	Cleaning Room General Ventilation	PM	3.0	3.1
12	Casting Shakeout & Sand Hauling Areas General Ventilation	PM	1.9	2.0

SN	Description	Pollutant	lb/hr	tpy
13	Spray Paint Booth	PM HAPs (including sources 14 and 16)	0.7 51.0	0.6 10
14	Powder Coating Operations	PM HAPs (see SN-13)	0.1	0.1
15	Heat Treat Furnace	PM	0.1	0.2
16	Spray Paint Booth	PM HAPs (see SN-13)	1.0	0.3
17	Rubber Mold Post Cure Oven	PM	0.1	0.1
18	Shot Blasting Operations	PM	0.4	1.7
19	Disk Preparation Operations	PM	0.3	1.2
21	Burn-Off Oven	PM	0.1	0.1
25	Rubber Mold Coating Operations	Ethyl Benzene Hexane Xylene Methanol	2.9 8.8 12.6 13.6	0.6 2.2 2.6 1.5
27	Grinding, Machining, and Tooling	PM	0.4	1.4
29	Isocure Core Room Scrubber	PM Triethyl Amine	0.2 0.4	0.2 0.1
32	Sinto Core Machine			
30	Shot Blasting Operation	PM	0.3	1.2
31	Pattern Shop and Core Storage	PM	0.4	1.7

3. Visible emissions may not exceed the limits specified in the following table of this permit as measured by EPA Reference Method 9. [A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

SN	Limit	Regulatory Citation
06a, 07, 08, 10, 11, 12, 15	20%	§19.503

01, 03, 04, 04a, 05, 13, 14, 16, 17, 18, 19, 21, 29, 30, 31, 32	5%	§18.501

4. The permittee shall not cause or permit the emission of air contaminants, including odors or water vapor and including an air contaminant whose emission is not otherwise prohibited by Regulation #18, if the emission of the air contaminant constitutes air pollution within the meaning of A.C.A. §8-4-303. [Regulation 18, §18.801 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

5. The permittee shall not conduct operations in such a manner as to unnecessarily cause air contaminants and other pollutants to become airborne. [Regulation 18, §18.901 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

6. Pursuant to §19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311, the permittee shall not melt more than 25,200 tons of iron in the induction furnaces, SN-07, in any consecutive 12 month period. Compliance with this condition will be shown by Specific Condition 7.

7. Pursuant to §19.705 and 40 CFR Part 52, Subpart E, the permittee shall maintain records of the iron melted in the induction furnaces, SN-07, each month. The permittee shall also keep records of the 12 month rolling total of iron processed. These records shall be kept on site, and shall be made available to Department personnel upon request.

8. Pursuant to §19.702 and 40 CFR Part 52, Subpart E, the permittee shall measure the particulate and PM_{10} emissions from the baghouse D-3, SN-03, within 180 days of the issuance of this permit. These tests shall be conducted in accordance with General Condition 7.

9. Pursuant to §19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311, the permittee shall not use a paint or thinner in SN-13, SN-14, or SN-16 with a VOC content greater than listed in the following table. Compliance will be shown by Specific Condition 12.

Source Number	VOC Content Limit (lb/gal)	
	Paint	Thinner
SN-13	4.92	7.20

SN-14	5.78	7.20
SN-16	6.58	7.20

10. Pursuant to §19.1004 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311, the permittee shall not use a paint or thinner in SN-13, SN-14, or SN-16 with a HAP content greater than listed in the following table. The coating limits listed are as applied. Thinner usage is for clean up only. Compliance will be shown by Specific Condition 13.

Coatings Table		Thinners Table	
Minimum TLV	Maximum HAP Content	Minimum TLV	Maximum HAP Content
381.40	7.5	151.20	7.5
358.80	7.0	147.70	7.0
336.10	6.5	144.30	6.5
317.90	6.0	141.10	6.0
290.90	5.5	137.20	5.5
270.30	5.0	134.00	5.0
253.00	4.5	130.70	4.5
235.60	4.0	127.10	4.0
218.20	3.5	123.60	3.5
200.80	3.0	120.20	3.0
183.40	2.5	116.80	2.5
166.40	2.0	113.30	2.0
149.90	1.5	109.90	1.5
132.70	1.0	106.40	1.0
116.10	0.5	103.00	0.5
107.90	0.25	101.30	0.25

11. The permittee shall maintain VOC records of all paint and thinners used in SN-13, 14, and 16. The permittee shall maintain records which include the name of each VOC containing material used in SN-13, 14, and 16, and the amount of each VOC containing material used. The permittee shall maintain monthly records which include the monthly total of VOC emitted, the content of VOC in the material in pounds per gallon as verified by manufactures MSDS sheets or equivalent, and the consecutive 12 month total of each VOC emitted. The monthly records shall be updated by the 15th day of the month following the month the records represent. [§19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

12. The permittee shall maintain records of HAP emissions. The permittee shall maintain records which include the name of each HAP containing material used in SN-13, 14, and 16 and the amount of each HAP containing material used. The permittee shall maintain monthly records which include the monthly total of each HAP emitted, the content of each HAP in the material in pounds per gallon as verified by manufactures MSDS sheets or equilivant, the TLV of each HAP used, the consecutive 12 month total of each HAP emitted, and the consecutive 12 month total of emissions of all HAPs combined. The monthly records shall be updated by the 15th day of the month following the month the records represent. [§18.1004 of Regulation 18 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

13. The permittee shall not use an adhesive in SN-25 with a VOC content greater than 6.35 lb/gal or a release agent with a VOC content greater than 6.95 lb/gal. Compliance will be shown by Specific Condition 16. [§19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

14. The permittee shall not use an adhesive in SN-25 with a Ethyl Benzene content greater than 1.3 lb/gal or a Xylene content greater than 5.45 lb/gal. The permittee shall not use a release agent with a Hexane content greater than 3.74 lb/gal. Compliance will be shown by Specific Condition 17. [§19.1004 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

15. The permittee shall maintain monthly VOC records of all VOC containing materials used in SN-25. These records shall include the name of the material, the VOC content of the material as verified by manufacturers MSDS or equivalent, and the 12 month rolling total of VOC emissions from SN-25. These records shall be updated by the 15th day of the month following the month which the records represent. [§19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

16. The permittee shall maintain records of HAP emissions from SN-25. The permittee shall maintain records which include the name of each HAP containing material used in SN-25, the content of each HAP in the material in weight percent, and the amount of each HAP containing material used. The permittee shall maintain monthly records which include the monthly total of each HAP emitted, the consecutive 12 month total of each HAP emitted, and the consecutive 12 month total of emissions of all HAPs combined. The monthly records shall be updated by the 15th day of the month following the month the records represent. [§18.1004 of Regulation 18 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

17. The permittee shall not use a binder in Phenolic Urethane No-bake process, SN-29a, with a VOC content greater than 3.62 lb/gal, and the permittee shall not use a binder in PUCB process SN-29 and SN-32, with a VOC content greater than 4.24 lb/gal. The catalysis used in the processes are 100% VOC by weight. Compliance with this condition will be shown by Specific Condition 19. The permittee uses a catalyst which is 100% Triethyl amine. [§19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

18. The permittee shall maintain monthly VOC records of all binders purchased for use in Phenolic Urethane No-bake process, SN-29a and the PUCB process, SN-29 and SN-32. These records shall include the name of the binder, the VOC content of the binder as verified by manufacturers MSDS or equivalent, and the 12 month rolling total of VOC emissions from the Phenolic Urethane No-bake process, SN-29 and the PUCB process, SN-32. These records shall be updated by the 15th day of the month following the month which the records represent. [§19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

19. The permittee shall not emit more than 17.3 tons of all HAPs combined from sources SN-13, 14, 16, and 25 in any consecutive 12 month period. The permittee shall maintain records of the total of HAPs emitted from sources SN-13, 14, 16, and 25 each month and consecutive 12 month total of HAPs emitted from these sources. These records shall be updated by the 15th day of the month following the month which the records represent. [§19.405(B) of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

20. The permittee shall not emit more than 9.9 tons of any single HAPs or 24.9 tpy of all HAPs combined from the facility in any consecutive 12 month period. The permittee shall maintain records of the total consecutive 12 month emissions of every single HAP emitted from the facility. These records shall be updated by the 15th day of the month following the month which the records represent. [§19.405(B) of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

21. The permittee shall operate the afterburner on SN-21 whenever the unit is operating and must maintain a minimum temperature greater than 1400ºF at SN-21 whenever the unit is in operation. The permittee must maintain daily records of the temperature of SN-21. These records shall be kept on site and made available to Department personnel upon request. [§19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Section V: INSIGNIFICANT ACTIVITIES

The Department deems the following types of activities or emissions as insignificant on the basis of size, emission rate, production rate, or activity in accordance with Group A of the Insignificant Activities list found in Regulation 18 and 19 Appendix A. Insignificant activity emission determinations rely upon the information submitted by the permittee in an application dated September 9, 1997.

Description	Category
Metal Preheater Gas Combustion Exhaust Vent Post Cure Oven BBC Preheater Casting Preheat Ovens Ladle preheaters (3) Casting Preheat Oven in Powder Coating Building	A-1
Facility Laboratory	A-5
Pressurized Propane Storage Tank	A-13
Forklifts	B-1
Hand Held Machining Equipment	B-17
Parking Areas and Roadways	A-13

Section VI: GENERAL CONDITIONS

1. Any terms or conditions included in this permit that specify and reference Arkansas Pollution Control & Ecology Commission Regulation 18 or the Arkansas Water and Air Pollution Control Act (A.C.A. §8-4-101 et seq.) as the sole origin of and authority for the terms or conditions are not required under the Clean Air Act or any of its applicable requirements, and are not federally enforceable under the Clean Air Act. Arkansas Pollution Control & Ecology Commission Regulation 18 was adopted pursuant to the Arkansas Water and Air Pollution Control Act (A.C.A. §8-4-101 et seq.). Any terms or conditions included in this permit that specify and reference Arkansas Pollution Control & Ecology Commission Regulation 18 or the Arkansas Water and Air Pollution Control Act (A.C.A. §8-4-101 et seq.) as the origin of and authority for the terms or conditions are enforceable under this Arkansas statute.

2. This permit does not relieve the owner or operator of the equipment and/or the facility from compliance with all applicable provisions of the Arkansas Water and Air Pollution Control Act and the regulations promulgated under the Act. [A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

3. The permittee will notify the Department in writing within thirty (30) days after commencement of construction, completion of construction, first operation of equipment and/or facility, and first attainment of the equipment and/or facility target production rate. [Regulation 19, §19.704 and/or A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

4. Construction or modification must commence within eighteen (18) months from the date of permit issuance. [Regulation 19, §19.410(B) and/or Regulation 18, §18.309(B) and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

5. The permittee must keep records for five years to enable the Department to determine compliance with the terms of this permit such as hours of operation, throughput, upset conditions, and continuous monitoring data. The Department may use the records, at the discretion of the Department, to determine compliance with the conditions of the permit. [Regulation 19, §19.705 and/or Regulation 18, §18.1004 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

6. A responsible official must certify any reports required by any condition contained in this permit and submit any reports to the Department at the address below. [Regulation 19, §19.705 and/or Regulation 18, §18.1004 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

   Arkansas Department of Environmental Quality
   Air Division
   ATTN: Compliance Inspector Supervisor
   Post Office Box 8913

Little Rock, AR 72219

7. The permittee will test any equipment scheduled for testing, unless stated in the Specific Conditions of this permit or by any federally regulated requirements, within the following time frames: (1) newly constructed or modified equipment within sixty (60) days of achieving the maximum production rate, but no later than 180 days after initial start up of the permitted source or (2) existing equipment already operating according to the time frames set forth by the Department. The permittee must notify the Department of the scheduled date of compliance testing at least fifteen (15) days in advance of such test. The permittee must submit compliance test results to the Department within thirty (30) days after the completion of testing. [Regulation 19, §19.702 and/or Regulation 18, §18.1002 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

8. The permittee will provide: [Regulation 19 , §19.702 and/or Regulation 18 , §18.1002 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

    a. Sampling ports adequate for applicable test methods
    b. Safe sampling platforms
    c. Safe access to sampling platforms
    d. Utilities for sampling and testing equipment

9. The permittee will operate equipment, control apparatus and emission monitoring equipment within their design limitations. The permittee will maintain in good condition at all times equipment, control apparatus and emission monitoring equipment. [Regulation 19, §19.303 and/or Regulation 18, §18.1104 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

10. If the permittee exceeds an emission limit established by this permit, the permittee will be deemed in violation of said permit and will be subject to enforcement action. The Department may forego enforcement action for emissions exceeding any limits established by this permit provided the following requirements are met: [Regulation 19, §19.601 and/or Regulation 18, §18.1101 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

    a. The permittee demonstrates to the satisfaction of the Department that the emissions resulted from an equipment malfunction or upset and are not the result of negligence or improper maintenance, and the permittee took all reasonable measures to immediately minimize or eliminate the excess emissions.
    b. The permittee reports the occurrence or upset or breakdown of equipment (by telephone, facsimile, or overnight delivery) to the Department by the end of the next business day after the occurrence or the discovery of the occurrence.
    c. The permittee must submit to the Department, within five business days after the occurrence or the discovery of the occurrence, a full, written report of such occurrence, including a statement of all known causes and of the scheduling and nature of the actions to be taken to minimize or eliminate future occurrences,

including, but not limited to, action to reduce the frequency of occurrence of such conditions, to minimize the amount by which said limits are exceeded, and to reduce the length of time for which said limits are exceeded. If the information is included in the initial report, the information need not be submitted again.

11. The permittee shall allow representatives of the Department upon the presentation of credentials: [A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

    a. To enter upon the permittee's premises, or other premises under the control of the permittee, where an air pollutant source is located or in which any records are required to be kept under the terms and conditions of this permit;
    b. To have access to and copy any records required to be kept under the terms and conditions of this permit, or the Act;
    c. To inspect any monitoring equipment or monitoring method required in this permit;
    d. To sample any emission of pollutants; and
    e. To perform an operation and maintenance inspection of the permitted source.

12. The Department issued this permit in reliance upon the statements and presentations made in the permit application. The Department has no responsibility for the adequacy or proper functioning of the equipment or control apparatus. [A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

13. The Department may revoke or modify this permit when, in the judgment of the Department, such revocation or modification is necessary to comply with the applicable provisions of the Arkansas Water and Air Pollution Control Act and the regulations promulgated the Arkansas Water and Air Pollution Control Act. [Regulation 19, §19.410(A) and/or Regulation 18, §18.309(A) and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

14. This permit may be transferred. An applicant for a transfer must submit a written request for transfer of the permit on a form provided by the Department and submit the disclosure statement required by Arkansas Code Annotated '8 1 106 at least thirty (30) days in advance of the proposed transfer date. The permit will be automatically transferred to the new permittee unless the Department denies the request to transfer within thirty (30) days of the receipt of the disclosure statement. The Department may deny a transfer on the basis of the information revealed in the disclosure statement or other investigation or, deliberate falsification or omission of relevant information. [Regulation 19, §19.407(B) and/or Regulation 18, §18.307(B) and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

15. This permit shall be available for inspection on the premises where the control apparatus is located. [A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

16. This permit authorizes only those pollutant emitting activities addressed herein. [A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

17. This permit supersedes and voids all previously issued air permits for this facility. [Regulation 18 and 19 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

18. The permittee must pay all permit fees in accordance with the procedures established in Regulation No. 9. [A.C.A §8-1-105(c)]

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

EFFECTIVE DATE: January 14, 2015

ISSUED TO

Asama Coldwater Manufacturing, Inc.
and
Gokoh Coldwater, Inc.

State Registration Number (SRN): N5814

LOCATED AT
180 Asama Parkway, Coldwater, Michigan 49036
100 Concept Drive, Coldwater, Michigan 49036

RENEWABLE OPERATING PERMIT

Permit Number: MI-ROP-N5814-2015

Expiration Date: January 14, 2020

Administratively Complete ROP Renewal Application Due Between July 14, 2018 and July 14, 2019

This Renewable Operating Permit (ROP) is issued in accordance with and subject to Section 5506(3) of Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451). Pursuant to Michigan Air Pollution Control Rule 210(1), this ROP constitutes the permittee's authority to operate the stationary source identified above in accordance with the general conditions, special conditions and attachments contained herein. Operation of the stationary source and all emission units listed in the permit are subject to all applicable future or amended rules and regulations pursuant to Act 451 and the federal Clean Air Act.

SOURCE-WIDE PERMIT TO INSTALL

Permit Number: MI-PTI-N5814-2015

This Permit to Install (PTI) is issued in accordance with and subject to Section 5505(5) of Act 451. Pursuant to Michigan Air Pollution Control Rule 214a, the terms and conditions herein, identified by the underlying applicable requirement citation of Rule 201(1)(a), constitute a federally enforceable PTI. The PTI terms and conditions do not expire and remain in effect unless the criteria of Rule 201(6) are met. Operation of all emission units identified in the PTI is subject to all applicable future or amended rules and regulations pursuant to Act 451 and the federal Clean Air Act.

Michigan Department of Environmental Quality

Mary A. Douglas, Kalamazoo District Supervisor

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AUTHORITY AND ENFORCEABILITY

For the purpose of this permit, the **permittee** is defined as any person who owns or operates an emission unit at a stationary source for which this permit has been issued. The **department** is defined in Rule 104(d) as the Director of the Michigan Department of Environmental Quality (MDEQ) or his or her designee.

The permittee shall comply with all specific details in the permit terms and conditions and the cited underlying applicable requirements. All terms and conditions in this ROP are both federally enforceable and state enforceable unless otherwise footnoted. Certain terms and conditions are applicable to most stationary sources for which an ROP has been issued. These general conditions are included in Part A of this ROP. Other terms and conditions may apply to a specific emission unit, several emission units which are represented as a flexible group, or the entire stationary source which is represented as a Source-Wide group. Special conditions are identified in Parts B, C, D and/or the appendices.

In accordance with Rule 213(2)(a), all underlying applicable requirements will be identified for each ROP term or condition. All terms and conditions that are included in a PTI, are streamlined or subsumed, or is state only enforceable will be noted as such.

In accordance with Section 5507 of Act 451, the permittee has included in the ROP application a compliance certification, a schedule of compliance, and a compliance plan. For applicable requirements with which the source is in compliance, the source will continue to comply with these requirements. For applicable requirements with which the source is not in compliance, the source will comply with the detailed schedule of compliance requirements that are incorporated as an appendix in this ROP. Furthermore, for any applicable requirements effective after the date of issuance of this ROP, the stationary source will meet the requirements on a timely basis, unless the underlying applicable requirement requires a more detailed schedule of compliance.

Issuance of this permit does not obviate the necessity of obtaining such permits or approvals from other units of government as required by law.

Section 1 – Asama Coldwater Manufacturing, Inc.

A. GENERAL CONDITIONS

Permit Enforceability

- All conditions in this permit are both federally enforceable and state enforceable unless otherwise noted. **(R 336.1213(5))**

- Those conditions that are hereby incorporated in a state-only enforceable Source-Wide PTI pursuant to Rule 201(2)(d) are designated by footnote one. **(R 336.1213(5)(a), R 336.1214a(5))**

- Those conditions that are hereby incorporated in a federally enforceable Source-Wide PTI pursuant to Rule 201(2)(c) are designated by footnote two. **(R 336.1213(5)(b), R 336.1214a(3))**

General Provisions

1. The permittee shall comply with all conditions of this ROP. Any ROP noncompliance constitutes a violation of Act 451, and is grounds for enforcement action, for ROP revocation or revision, or for denial of the renewal of the ROP. All terms and conditions of this ROP that are designated as federally enforceable are enforceable by the Administrator of the United States Environmental Protection Agency (USEPA) and by citizens under the provisions of the federal Clean Air Act (CAA). Any terms and conditions based on applicable requirements which are designated as "state only" are not enforceable by the USEPA or citizens pursuant to the CAA. **(R 336.1213(1)(a))**

2. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this ROP. **(R 336.1213(1)(b))**

3. This ROP may be modified, revised, or revoked for cause. The filing of a request by the permittee for a permit modification, revision, or termination, or a notification of planned changes or anticipated noncompliance does not stay any ROP term or condition. This does not supersede or affect the ability of the permittee to make changes, at the permittee's own risk, pursuant to Rule 215 and Rule 216. **(R 336.1213(1)(c))**

4. The permittee shall allow the department, or an authorized representative of the department, upon presentation of credentials and other documents as may be required by law and upon stating the authority for and purpose of the investigation, to perform any of the following activities **(R 336.1213(1)(d))**:
   a. Enter, at reasonable times, a stationary source or other premises where emissions-related activity is conducted or where records must be kept under the conditions of the ROP.
   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the ROP.
   c. Inspect, at reasonable times, any of the following:
      i. Any stationary source.
      ii. Any emission unit.
      iii. Any equipment, including monitoring and air pollution control equipment.
      iv. Any work practices or operations regulated or required under the ROP.
   d. As authorized by Section 5526 of Act 451, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the ROP or applicable requirements.

5. The permittee shall furnish to the department, within a reasonable time, any information the department may request, in writing, to determine whether cause exists for modifying, revising, or revoking the ROP or to determine compliance with this ROP. Upon request, the permittee shall also furnish to the department copies of any records that are required to be kept as a term or condition of this ROP. For information which is claimed by the permittee to be confidential, consistent with the requirements of the 1976 PA 442, MCL §15.231 et seq., and known as the Freedom of Information Act, the person may also be required to furnish the records directly to the USEPA together with a claim of confidentiality. **(R 336.1213(1)(e))**

6. A challenge by any person, the Administrator of the USEPA, or the department to a particular condition or a part of this ROP shall not set aside, delay, stay, or in any way affect the applicability or enforceability of any other condition or part of this ROP. **(R 336.1213(1)(f))**

7. The permittee shall pay fees consistent with the fee schedule and requirements pursuant to Section 5522 of Act 451. **(R 336.1213(1)(g))**

8. This ROP does not convey any property rights or any exclusive privilege. **(R 336.1213(1)(h))**

Equipment & Design

9. Any collected air contaminants shall be removed as necessary to maintain the equipment at the required operating efficiency. The collection and disposal of air contaminants shall be performed in a manner so as to minimize the introduction of contaminants to the outer air. Transport of collected air contaminants in Priority I and II areas requires the use of material handling methods specified in Rule 370(2). **(R 336.1370)**

10. Any air cleaning device shall be installed, maintained, and operated in a satisfactory manner and in accordance with the Michigan Air Pollution Control rules and existing law. **(R 336.1910)**

Emission Limits

11. Except as provided in Subrules 2, 3, and 4 of Rule 301, states in part; "a person shall not cause or permit to be discharged into the outer air from a process or process equipment a visible emission of a density greater than the most stringent of Rule 301(1)(a) or (b) unless otherwise specified in this ROP." The grading of visible emissions shall be determined in accordance with Rule 303 **(R 336.1301(1) in pertinent part)**:
    a. A 6-minute average of 20 percent opacity, except for one 6-minute average per hour of not more than 27 percent opacity.
    b. A limit specified by an applicable federal new source performance standard.

12. The permittee shall not cause or permit the emission of an air contaminant or water vapor in quantities that cause, alone or in reaction with other air contaminants, either of the following:
    a. Injurious effects to human health or safety, animal life, plant life of significant economic value, or property.[1] **(R 336.1901(a))**
    b. Unreasonable interference with the comfortable enjoyment of life and property.[1] **(R 336.1901(b))**

Testing/Sampling

13. The department may require the owner or operator of any source of an air contaminant to conduct acceptable performance tests, at the owner's or operator's expense, in accordance with Rule 1001 and Rule 1003, under any of the conditions listed in Rule 1001(1). **(R 336.2001)**

14. Any required performance testing shall be conducted in accordance with Rule 1001(2), Rule 1001(3) and Rule 1003. **(R 336.2001(2), R 336.2001(3), R 336.2003(1))**

15. Any required test results shall be submitted to the Air Quality Division (AQD) in the format prescribed by the applicable reference test method within 60 days following the last date of the test. **(R 336.2001(4))**

Monitoring/Recordkeeping

16. Records of any periodic emission or parametric monitoring required in this ROP shall include the following information specified in Rule 213(3)(b)(i), where appropriate **(R 336.1213(3)(b))**:
    a. The date, location, time, and method of sampling or measurements.
    b. The dates the analyses of the samples were performed.
    c. The company or entity that performed the analyses of the samples.
    d. The analytical techniques or methods used.
    e. The results of the analyses.
    f. The related process operating conditions or parameters that existed at the time of sampling or measurement.

17. All required monitoring data, support information and all reports, including reports of all instances of deviation from permit requirements, shall be kept and furnished to the department upon request for a period of not less than 5 years from the date of the monitoring sample, measurement, report or application. Support information includes all calibration and maintenance records and all original strip-chart recordings, or other original data records, for continuous monitoring instrumentation and copies of all reports required by the ROP. **(R 336.1213(1)(e), R 336.1213(3)(b)(ii))**

Certification & Reporting

18. Except for the alternate certification schedule provided in Rule 213(3)(c)(iii)(B), any document required to be submitted to the department as a term or condition of this ROP shall contain an original certification by a Responsible Official which states that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete. **(R 336.1213(3)(c))**

19. A Responsible Official shall certify to the appropriate AQD District Office and to the USEPA that the stationary source is and has been in compliance with all terms and conditions contained in the ROP except for deviations that have been or are being reported to the appropriate AQD District Office pursuant to Rule 213(3)(c). This certification shall include all the information specified in Rule 213(4)(c)(i) through (v) and shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the certification are true, accurate, and complete. The USEPA address is: USEPA, Air Compliance Data - Michigan, Air and Radiation Division, 77 West Jackson Boulevard, Chicago, Illinois 60604. **(R 336.1213(4)(c))**

20. The certification of compliance shall be submitted annually for the term of this ROP as detailed in the special conditions, or more frequently if specified in an applicable requirement or in this ROP. **(R 336.1213(4)(c))**

21. The permittee shall promptly report any deviations from ROP requirements and certify the reports. The prompt reporting of deviations from ROP requirements is defined in Rule 213(3)(c)(ii) as follows, unless otherwise described in this ROP **(R 336.1213(3)(c))**:
    a. For deviations that exceed the emissions allowed under the ROP, prompt reporting means reporting consistent with the requirements of Rule 912 as detailed in Condition 25. All reports submitted pursuant to this paragraph shall be promptly certified as specified in Rule 213(3)(c)(iii).
    b. For deviations which exceed the emissions allowed under the ROP and which are not reported pursuant to Rule 912 due to the duration of the deviation, prompt reporting means the reporting of all deviations in the semiannual reports required by Rule 213(3)(c)(i). The report shall describe reasons for each deviation and the actions taken to minimize or correct each deviation.
    c. For deviations that do not exceed the emissions allowed under the ROP, prompt reporting means the reporting of all deviations in the semiannual reports required by Rule 213(3)(c)(i). The report shall describe the reasons for each deviation and the actions taken to minimize or correct each deviation.

22. For reports required pursuant to Rule 213(3)(c)(ii), prompt certification of the reports is described in Rule 213(3)(c)(iii) as either of the following **(R 336.1213(3)(c))**:
    a. Submitting a certification by a Responsible Official with each report which states that, based on information and belief formed after reasonable inquiry, the statements and information in the report are true, accurate, and complete.
    b. Submitting, within 30 days following the end of a calendar month during which one or more prompt reports of deviations from the emissions allowed under the ROP were submitted to the department pursuant to Rule 213(3)(c)(ii), a certification by a Responsible Official which states that, "based on information and belief formed after reasonable inquiry, the statements and information contained in each of the reports submitted during the previous month were true, accurate, and complete". The certification shall include a listing of the reports that are being certified. Any report submitted pursuant to Rule 213(3)(c)(ii) that will be certified on a monthly basis pursuant to this paragraph shall include a statement that certification of the report will be provided within 30 days following the end of the calendar month.

23. Semiannually for the term of the ROP as detailed in the special conditions, or more frequently if specified, the permittee shall submit certified reports of any required monitoring to the appropriate AQD District Office. All instances of deviations from ROP requirements during the reporting period shall be clearly identified in the reports. **(R 336.1213(3)(c)(i))**

24. On an annual basis, the permittee shall report the actual emissions, or the information necessary to determine the actual emissions, of each regulated air pollutant as defined in Rule 212(6) for each emission unit utilizing the emissions inventory forms provided by the department. **(R 336.1212(6))**

25. The permittee shall provide notice of an abnormal condition, start-up, shutdown, or malfunction that results in emissions of a hazardous or toxic air pollutant which continue for more than one hour in excess of any applicable standard or limitation, or emissions of any air contaminant continuing for more than two hours in excess of an applicable standard or limitation, as required in Rule 912, to the appropriate AQD District Office. The notice shall be provided not later than two business days after the start-up, shutdown, or discovery of the abnormal conditions or malfunction. Notice shall be by any reasonable means, including electronic, telephonic, or oral communication. Written reports, if required under Rule 912, must be submitted to the appropriate AQD District Supervisor within 10 days after the start-up or shutdown occurred, within 10 days after the abnormal conditions or malfunction has been corrected, or within 30 days of discovery of the abnormal conditions or malfunction, whichever is first. The written reports shall include all of the information required in Rule 912(5) and shall be certified by a Responsible Official in a manner consistent with the CAA. **(R 336.1912)**

Permit Shield

26. Compliance with the conditions of the ROP shall be considered compliance with any applicable requirements as of the date of ROP issuance, if either of the following provisions is satisfied **(R 336.1213(6)(a)(i), R 336.1213(6)(a)(ii))**:
    a. The applicable requirements are included and are specifically identified in the ROP.
    b. The permit includes a determination or concise summary of the determination by the department that other specifically identified requirements are not applicable to the stationary source.

    Any requirements identified in Part E of this ROP have been identified as non-applicable to this ROP and are included in the permit shield.

27. Nothing in this ROP shall alter or affect any of the following:
    a. The provisions of Section 303 of the CAA, emergency orders, including the authority of the USEPA under Section 303 of the CAA. **(R 336.1213(6)(b)(i))**
    b. The liability of the owner or operator of this source for any violation of applicable requirements prior to or at the time of this ROP issuance. **(R 336.1213(6)(b)(ii))**
    c. The applicable requirements of the acid rain program, consistent with Section 408(a) of the CAA. **(R 336.1213(6)(b)(iii))**

d. The ability of the USEPA to obtain information from a source pursuant to Section 114 of the CAA. **(R 336.1213(6)(b)(iv))**

28. The permit shield shall not apply to provisions incorporated into this ROP through procedures for any of the following:
    a. Operational flexibility changes made pursuant to Rule 215. **(R 336.1215(5))**
    b. Administrative Amendments made pursuant to Rule 216(1)(a)(i)-(iv). **(R 336.1216(1)(b)(iii))**
    c. Administrative Amendments made pursuant to Rule 216(1)(a)(v) until the amendment has been approved by the department. **(R 336.1216(1)(c)(iii))**
    d. Minor Permit Modifications made pursuant to Rule 216(2). **(R 336.1216(2)(f))**
    e. State-Only Modifications made pursuant to Rule 216(4) until the changes have been approved by the department. **(R 336.1216(4)(e))**

29. Expiration of this ROP results in the loss of the permit shield. If a timely and administratively complete application for renewal is submitted not more than 18 months, but not less than 6 months, before the expiration date of the ROP, but the department fails to take final action before the end of the ROP term, the existing ROP does not expire until the renewal is issued or denied, and the permit shield shall extend beyond the original ROP term until the department takes final action. **(R 336.1217(1)(c), R 336.1217(1)(a))**

Revisions

30. For changes to any process or process equipment covered by this ROP that do not require a revision of the ROP pursuant to Rule 216, the permittee must comply with Rule 215. **(R 336.1215, R 336.1216)**

31. A change in ownership or operational control of a stationary source covered by this ROP shall be made pursuant to Rule 216(1). **(R 336.1219(2))**

32. For revisions to this ROP, an administratively complete application shall be considered timely if it is received by the department in accordance with the time frames specified in Rule 216. **(R 336.1210(9))**

33. Pursuant to Rule 216(1)(b)(iii), Rule 216(2)(d) and Rule 216(4)(d), after a change has been made, and until the department takes final action, the permittee shall comply with both the applicable requirements governing the change and the ROP terms and conditions proposed in the application for the modification. During this time period, the permittee may choose to not comply with the existing ROP terms and conditions that the application seeks to change. However, if the permittee fails to comply with the ROP terms and conditions proposed in the application during this time period, the terms and conditions in the ROP are enforceable. **(R 336.1216(1)(c)(iii), R 336.1216(2)(d), R 336.1216(4)(d))**

Reopenings

34. A ROP shall be reopened by the department prior to the expiration date and revised by the department under any of the following circumstances:
    a. If additional requirements become applicable to this stationary source with three or more years remaining in the term of the ROP, but not if the effective date of the new applicable requirement is later than the ROP expiration date. **(R 336.1217(2)(a)(i))**
    b. If additional requirements pursuant to Title IV of the CAA become applicable to this stationary source. **(R 336.1217(2)(a)(ii))**
    c. If the department determines that the ROP contains a material mistake, information required by any applicable requirement was omitted, or inaccurate statements were made in establishing emission limits or the terms or conditions of the ROP. **(R 336.1217(2)(a)(iii))**
    d. If the department determines that the ROP must be revised to ensure compliance with the applicable requirements. **(R 336.1217(2)(a)(iv))**

Renewals

35. For renewal of this ROP, an administratively complete application shall be considered timely if it is received by the department not more than 18 months, but not less than 6 months, before the expiration date of the ROP. **(R 336.1210(7))**

Stratospheric Ozone Protection

36. If the permittee is subject to Title 40 of the Code of Federal Regulations (CFR), Part 82 and services, maintains, or repairs appliances except for motor vehicle air conditioners (MVAC), or disposes of appliances containing refrigerant, including MVAC and small appliances, or if the permittee is a refrigerant reclaimer, appliance owner or a manufacturer of appliances or recycling and recovery equipment, the permittee shall comply with all applicable standards for recycling and emissions reduction pursuant to 40 CFR, Part 82, Subpart F.

37. If the permittee is subject to 40 CFR, Part 82, and performs a service on motor (fleet) vehicles when this service involves refrigerant in the MVAC, the permittee is subject to all the applicable requirements as specified in 40 CFR, Part 82, Subpart B, Servicing of Motor Vehicle Air Conditioners. The term "motor vehicle" as used in Subpart B does not include a vehicle in which final assembly of the vehicle has not been completed by the original equipment manufacturer. The term MVAC as used in Subpart B does not include the air-tight sealed refrigeration system used for refrigerated cargo or an air conditioning system on passenger buses using Hydrochlorofluorocarbon-22 refrigerant.

Risk Management Plan

38. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall register and submit to the USEPA the required data related to the risk management plan for reducing the probability of accidental releases of any regulated substances listed pursuant to Section 112(r)(3) of the CAA as amended in 40 CFR 68.130. The list of substances, threshold quantities, and accident prevention regulations promulgated under 40 CFR, Part 68, do not limit in any way the general duty provisions under Section 112(r)(1).

39. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall comply with the requirements of 40 CFR, Part 68, no later than the latest of the following dates as provided in 40 CFR 68.10(a):
    a. June 21, 1999,
    b. Three years after the date on which a regulated substance is first listed under 40 CFR 68.130, or
    c. The date on which a regulated substance is first present above a threshold quantity in a process.

40. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall submit any additional relevant information requested by any regulatory agency necessary to ensure compliance with the requirements of 40 CFR, Part 68.

41. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall annually certify compliance with all applicable requirements of Section 112(r) as detailed in Rule 213(4)(c)). **(40 CFR, Part 68)**

Emission Trading

42. Emission averaging and emission reduction credit trading are allowed pursuant to any applicable interstate or regional emission trading program that has been approved by the Administrator of the USEPA as a part of Michigan's State Implementation Plan. Such activities must comply with Rule 215 and Rule 216. **(R 336.1213(12))**

Permit To Install (PTI)

43. The process or process equipment included in this permit shall not be reconstructed, relocated, or modified unless a PTI authorizing such action is issued by the department, except to the extent such action is exempt from the PTI requirements by any applicable rule. [2] **(R 336.1201(1))**

44. The department may, after notice and opportunity for a hearing, revoke PTI terms or conditions if evidence indicates the process or process equipment is not performing in accordance with the terms and conditions of the PTI or is violating the department's rules or the CAA. [2] **(R 336.1201(8), Section 5510 of Act 451)**

45. The terms and conditions of a PTI shall apply to any person or legal entity that now or hereafter owns or operates the process or process equipment at the location authorized by the PTI. If a new owner or operator submits a written request to the department pursuant to Rule 219 and the department approves the request, this PTI will be amended to reflect the change of ownership or operational control. The request must include all of the information required by Subrules (1)(a), (b) and (c) of Rule 219. The written request shall be sent to the appropriate AQD District Supervisor, MDEQ. [2] **(R 336.1219)**

46. If the installation, reconstruction, relocation, or modification of the equipment for which PTI terms and conditions have been approved has not commenced within 18 months, or has been interrupted for 18 months, the applicable terms and conditions from that PTI shall become void unless otherwise authorized by the department. Furthermore, the person to whom that PTI was issued, or the designated authorized agent, shall notify the department via the Supervisor, Permit Section, MDEQ, AQD, P. O. Box 30260, Lansing, Michigan 48909, if it is decided not to pursue the installation, reconstruction, relocation, or modification of the equipment allowed by the terms and conditions from that PTI. [2] **(R 336.1201(4))**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

B. SOURCE-WIDE CONDITIONS

Part B outlines the Source-Wide Terms and Conditions that apply to this stationary source. The permittee is subject to these special conditions for the stationary source in addition to the general conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply to this source, NA (not applicable) has been used in the table. If there are no Source-Wide Conditions, this section will be left blank.

C. EMISSION UNIT CONDITIONS

Part C outlines terms and conditions that are specific to individual emission units listed in the Emission Unit Summary Table. The permittee is subject to the special conditions for each emission unit in addition to the General Conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply, NA (not applicable) has been used in the table. If there are no conditions specific to individual emission units, this section will be left blank.

EMISSION UNIT SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EUMPCC-S1	Metal melting, pouring, and casting cooling process equipment with two electric induction furnaces with a combined daily average melting capacity of 8 tons per hour. Emissions from these processes are controlled by a 49,000 dscfm baghouse.	06/17/97 02/25/04	FGFOUNDRY-S1 FGCAM_UNITS-S1
EUSANDSYSTEM-S1	Mold making, shakeout, and sand processing equipment. Emissions from these processes are controlled by a 66,000 dscfm baghouse.	06/17/97 02/25/04	FGFOUNDRY-S1 FGCAM_UNITS-S1
EUSHOTBLAST-S1	A shotblast machine with a mechanical pre-cleaner followed by a 7,500 scfm baghouse that vents outside on or after August 14, 2006.	06/17/97 08/14/06	NA
EU-MP-S1	Consists of two electric induction melting furnaces with an 11 ton holding capacity each, and a monorail pouring station with three ladles. Emissions from melting and pouring processes are controlled by associated hoods, enclosures, ductwork, and a 37,500 acfm baghouse.	12/01/07 NA	FG-NEWFOUNDRY-S1
EU-MCS-S1	Consists of the automated mold cooling conveyors and automated sand shakeout lines, including a flat deck shakeout system. Emissions from these processes are controlled by associated hoods, enclosures, ductwork, a baghouse, and a regenerative thermal oxidizer. The exhaust gas flow from this unit is approximately 61,200 acfm.	01/01/07 06/20/13	FG-NEWFOUNDRY-S1 FGCAM_UNITS-S1
EU-SS-S1	Consists of the molding machine and related sand handling equipment. Emissions from the mold making process are controlled by associated hoods, enclosures, ductwork, and a 56,900 acfm baghouse.	12/01/07	FG-NEWFOUNDRY-S1 FGCAM_UNITS-S1
EU-CCFBACK-S1	Consists of the back section of casting cooling conveyors and a shot blast machine. Emissions from this emission unit are controlled by associated hoods, enclosures, ductwork, and a 65,360 acfm baghouse.	12/01/07	FG-NEWFOUNDRY-S1 FGCAM_UNITS-S1

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EUCOLDCLEANER-S1	Any cold cleaner that is grandfathered or exempt from Rule 201 pursuant to Rule 281(h), or Rule 285(r)(iv). Existing cold cleaners were placed into operation prior to July 1, 1979. New cold cleaners were placed into operation on or after July 1, 1979.	06/17/97 NA	FG-COLDCLEANERS-S1
EUCONVEYOR-S1	Casting cooling vibratory conveyor section that is covered and ventilated to a 28,000 dscfm baghouse.	01/01/04 NA	FG-RULE290-S1
EU-EMERGEN1-S1	Diesel fired emergency power generator for the new foundry.	01/07/07	NA
EU-EMERGEN2-S1	Natural gas fired emergency power generator for the existing foundry.	01/08/96	NA
EULine 1-S1	The GEOMET paint line systems consisting of a mixing room, a paint spray booth equipped with HVLP applicators and dry filter overspray control, and an induction cure process consisting of pre-curing and final cure steps for coating of metallic surfaces.	12/22/11	FG-COATING-S1, FG-MACT MMMM-S1
EULine 2-S1	The GEOMET paint line systems consisting of a mixing room, a paint spray booth equipped with HVLP applicators and dry filter overspray control, and an induction cure process consisting of pre-curing and final cure steps for coating of metallic surfaces.	03/25/14	FG-COATING-S1, FG-MACT MMMM-S1
EULine 3-S1	The GEOMET paint line systems consisting of a mixing room, a paint spray booth equipped with HVLP applicators and dry filter overspray control, and an induction cure process consisting of pre-curing and final cure steps for coating of metallic surfaces.	To Be Determined	FG-COATING-S1, FG-MACT MMMM-S1

EUMPCC-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Metal melting, pouring, and casting cooling process equipment with two electric induction furnaces with a combined daily average melting capacity of 8 tons per hour. Emissions from these processes are controlled by a 49,000 dscfm baghouse.

Flexible Group ID: FGFOUNDRY-S1, FGCAM_UNITS-S1

POLLUTION CONTROL EQUIPMENT

Baghouse

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Carbon Monoxide	57.5 pph[2]	Test Protocol	EUMPCC-S1	SC V.2	**R 336.1205(3)**
2. Particulate Matter (or Total Metal HAPs)	0.005 gr/dscf exhaust gases or 2.1 pph[2] Or 0.0004 gr/dscf exhaust gases	Test Protocol	EUMPCC-S1	SC V.2, V.4	**R 336.1331** **40 CFR 63.7690(a)(1)(i)**
3. Volatile Organic Compounds	10.0 pph[2]	Test Protocol	EUMPCC-S1	SC V.2	**R 336.1702**
4. Opacity	10 percent[2]	Six-minute average	Stack listed in VIII	SC V.3	**R 336.1301(1)(c)**
5. Visible Emissions	20% opacity (except for one 6-minute average per hour of not more than 27% opacity)	Test Protocol	Any building or structure housing EUMPCC-S1	SC V.1	**40 CFR 63.7690(a)(7)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall submit to the AQD District Supervisor, for review and approval, an operation and maintenance (O&M) plan for each capture and control system and control device for an emission unit subject to an emission limit as described in 40 CFR 63.7710. The plan shall include, but is not limited to, the following:
   a. Monthly inspections of the equipment that is important to the performance of the total capture system. **(40 CFR 63.7710(b)(1))**
   b. Operating limits for each capture system for an emission unit subject to a limit for VOHAP or TEA. **(40 CFR 63.7710(b)(2))**
   c. Preventative maintenance plan for each control device, including a schedule. **(40 CFR 63.7710(b)(3))**
   d. A site-specific monitoring plan for each bag leak detection system. **(40 CFR 63.7710(b)(4))**
   e. Corrective action plan for each baghouse. **(40 CFR 63.7710(b)(5))**
   f. Procedures for igniting gases from mold vents. **(40 CFR 63.7710(b)(6))**

   The permittee shall maintain and implement the approved O&M plans at all times. **(40 CFR 63.7710, 40 CFR 63.7745))**

2. For each capture system, wet scrubber, acid wet scrubber, or combustion device, the permittee shall establish site-specific operating limits in the O&M plans according to the procedures specified in 40 CFR 63.7733. **(40 CFR 63.7733)**

3. The permittee shall comply with the emission limits, work practice standards, and operation and maintenance requirements at all times, except during periods of startup, shutdown, or malfunction. **(40 CFR 63.7720(a))**

4. The permittee shall develop and implement a written startup, shutdown and malfunction plan (SSMP) in accordance with 40 CFR 63.6(e)(3). This plan must address the startup, shutdown and corrective actions in the event of a malfunction of the emission capture system or the add-on control device. The permittee shall operate in accordance with the SSMP when applicable. **(40 CFR 63.7720(c), 40 CFR 63.6(e)(3))**

5. For each segregated scrap storage area, bin or pile, the permittee shall prepare and operate at all times according to a written certification that the facility purchases and uses only charge material that does not include post-consumer automotive body scrap, post-consumer engine blocks, post-consumer oil filters, oily turnings, lead components, mercury switches, plastics or free organic liquids as specified in 40 CFR 63.7700(b) –OR– the permittee shall prepare and operate according to an approved written plan for the selection and inspection of iron and steel scrap as specified in 40 CFR 63.7700(c).[2] **(40 CFR 63.7700(a), 40 CFR 63.7700(b), 40 CFR 63.7700(c)**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall conduct a performance test to demonstrate compliance with the opacity limit in 40 CFR 63.7690(a)(7), following the test methods and procedures in 40 CFR 63.7732(d). Subsequent compliance testing shall be conducted no less frequently than every six months. **(40 CFR 63.7731(b))**

2. Within 180 days of permit issuance, verification of CO, PM and VOC emission rates from EUMPCC-S1, by testing at owner's expense, in accordance with Department's requirements, will be required. No less than 30 days prior to testing, a complete test plan shall be submitted to the AQD. The final plan must be approved by the AQD prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test.[2] **(R 336.1205, R 336.1702, R 336.2001, R 336.2003, R 336.2004, R 336.1213(3))**

3. On a weekly basis, the permittee shall perform and record the results of six-minute observations of visible emissions from SVMPCC-S1 during daylight hours under routine maximum operating conditions. If visible

emissions are observed, the permittee shall initiate appropriate corrective actions listed in the approved operation and maintenance (O & M) plan. **(R 336.1213(3))**

4. The permittee shall conduct subsequent compliance testing to demonstrate compliance with all applicable emission limits, no less frequently than every five years. This requirement does not apply if a Continuous Emission Monitoring System (CEMS) is used to demonstrate continuous compliance. **(40 CFR 63.7731(a))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall monitor the relative change in PM loading using a bag leak detection system for any baghouse used to meet PM or Total Metal HAP emission limits. **(40 CFR 63.7740(b))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. The permittee shall report each instance in which each emission limitation, each work practice standard, and each operation and maintenance requirement was not met, in accordance with the requirements of 40 CFR 63.7751. **(40 CFR 63.7746, 40 CFR 63.7751)**

5. The permittee shall submit applicable notifications specified in 40 CFR 63.6(h)(4) and (5), 40 CFR 63.7(b) and (c), 63.8(e), 63.8(f)(4) through (6), and 63.9(d) through (h) for a notification of intent to conduct a performance test, and a notification of compliance status as specified in 40 CFR 63.7750. **(40 CFR 63.7750)**

6. The permittee shall submit all semiannual compliance reports and semiannual reports of monitoring and deviations from any emissions limitation or operation and maintenance requirement as required by 40 CFR 63.7751(a), (b), and (d). **(40 CFR 63.7751 (a), (b), and (d))**

7. If a startup, shutdown, or malfunction occurs during the semiannual reporting period, that is not consistent with the SSMP, the permittee shall submit an immediate SSM report according to the requirements of 40 CFR 63.10(d)(5)(ii). **(40 CFR 63.10(d)(5)(ii), 40 CFR 63.7751(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SVMPCC-S1	52[2]	90[2]	**40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR, Part 63, Subparts A and EEEEE for Iron and Steel Foundries by the compliance date specified in 40 CFR 63.7683. **(40 CFR Part 63, Subparts A and EEEEE)**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EUSANDSYSTEM-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Mold making, shakeout, and sand processing equipment. Emissions from these processes are controlled by a 66,000 dscfm baghouse.

Flexible Group ID: FGFOUNDRY-S1-S1, FGCAM_UNITS-S1

POLLUTION CONTROL EQUIPMENT

Baghouse

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Carbon Monoxide	7.5 pph[2]	Test Protocol	EUSANDSYSTEM-S1	SC V.1	**R 336.1205(3)**
2. Particulate Matter	0.005 gr/dscf exhaust gases or 2.8 pph[2]	Test Protocol	EUSANDSYSTEM-S1	SC V.1	**R 336.1331**
3. Volatile Organic Compounds	6.0 pph[2]	Test Protocol	EUSANDSYSTEM-S1	SC V.1	**R 336.1702**
4. Opacity	5 percent[2]	6-minute average	Stack listed in VIII	SC VI.1	**R 336.1301(1)(c)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. Within 180 days of permit issuance, verification of CO, PM and VOC emission rates from EUSANDSYSTEM-S1, by testing at owner's expense, in accordance with Department's requirements, will be required. No less than 30 days prior to testing, a complete test plan shall be submitted to the AQD. The final plan must be approved by the AQD prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test.[2] **(R 336.1205, R 336.1702, R 336.2001, R 336.2003, R 336.2004, R 336.1213(3).**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. On a daily basis, the permittee shall perform and record the results of 6-minute observation of visible emissions from SVSS-S1 during daylight hours under routine maximum operating conditions. If visible emissions are observed, the permittee shall initiate appropriate corrective actions listed in the approved operation and maintenance (O & M) plan. **(R 336.1213(3), 40 CFR 64.6(c)(1)(i and ii)))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SVSS-S1	62[2]	110[2]	**40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EUSHOTBLAST-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

A shotblast machine with a mechanical pre-cleaner followed by a 7,500 scfm baghouse that vents outside after August 14, 2006.

Flexible Group ID: NA

POLLUTION CONTROL EQUIPMENT

Baghouse

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Particulate	0.01 pounds per 1,000 pounds of exhaust gases[2]	Test Protocol	EUSHOTBLAST-S1	SC VI.1	**R 336.1331 Table 31 J**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall perform daily non-certified visible emissions check when EUSHOTBLAST-S1 is operating. If visible emissions are observed, the permittee shall perform preventative maintenance. The results shall be recorded in the baghouse maintenance log.[2] **(R 336.1213(3)(a)(ii))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

1. The exhaust gases from the EUSHOTBLAST-S1 stack shall be discharged unobstructed vertically upwards to the ambient air. **(R 336.1213(3))**

IX. OTHER REQUIREMENT(S)

1. The permittee shall perform and record preventative maintenance activities in accordance with the approved preventative maintenance plan. **(R 336.1213(3))**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-MP-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Consists of two electric induction melting furnaces with an 11 ton holding capacity each, and a monorail pouring station with three ladles. Emissions from melting and pouring processes are controlled by associated hoods, enclosures, ductwork, and a 37,500 acfm baghouse.

Flexible Group ID: FG-NEWFOUNDRY-S1

POLLUTION CONTROL EQUIPMENT

37,500 acfm baghouse

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. PM ---OR--- Total Metal HAP	0.001 gr/dscf ---OR--- 0.00008 gr/dscf[2]	Test Protocol	EU-MP-S1	SC V.1, VI.1	**40 CFR 63.7690(a)(4)(i) or (ii) and (a)(6)(i) or (ii)**
2. PM-10	0.30 pph[2]	Test Protocol	EU-MP-S1	SC V.2, V.3	**40 CFR 52.21 (j)**
3. VOC	5.28 pph[2]	Test Protocol	EU-MP-S1	SC V.2, V.3	**40 CFR 52.21 (j)**
4. CO	44.55 pph[2]	Test Protocol	EU-MP-S1	SC V.2, V.3	**40 CFR 52.21 (j)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall implement procedures for igniting gases from mold vents in pouring areas and pouring stations that use a sand mold system as specified in the approved operation and maintenance (O&M) plan. These procedures may be waived if the permittee determines that the mold vent gases are not ignitable, ignite automatically, or cannot be ignited due to accessibility or safety issues. The permittee shall document and maintain records of this determination at the facility and make them available to the Department upon request.[2] **(40 CFR 63.7710(b)(6))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-MP-S1 unless the associated capture system and baghouse control system are installed and operating in accordance with the approved operation and maintenance (O&M) plan.[2] **(R 336.1224, R 336.1225, R 336.1910, 40 CFR 52.21(j), 40 CFR Part 63.6 (e)(1)(i), 40 CFR 63.7710)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall conduct subsequent compliance testing to demonstrate compliance with the applicable PM or Total Metal HAP emission limits, no less frequently than every 5 years. This requirement does not apply if a CEMS is used to demonstrate continuous compliance. No less than 30 days prior to testing, the permittee shall submit a complete test plan to the AQD. The AQD must approve the final plan prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test.[2] **(40 CFR 63.7731(a))**

2. Within 180 days of permit issuance, the permittee shall verify PM-10, VOC, and CO emission rates from EU-MP-S1 by testing at owner's expense, in accordance with Department requirements. No less than 30 days prior to testing, the permittee shall submit a complete test plan to the AQD. The AQD must approve the final plan prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test.[2] **(R 336.1205(1)(a) and (b), R 336.2001, R 336.2003, R 336.2004, 40 CFR 52.21(j)**)

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall monitor the relative change in PM loading using a bag leak detection system for the EU-MP-S1 baghouse.[2] **(40 CFR 63.7740(b))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. The permittee shall report each instance in which each emission limitation, each work practice standard, and each operation and maintenance requirement was not met, in accordance with the requirements of 40 CFR 63.7751. **(40 CFR 63.7746, 40 CFR 63.7751)**

5. The permittee shall submit applicable notifications specified in 40 CFR 63.6(h)(4) and (5), 40 CFR 63.7(b) and (c), 63.8(e), 63.8(f)(4) through (6), and 63.9(d) through (h) for a notification of intent to conduct a performance test, and a notification of compliance status as specified in 40 CFR 63.7750. **(40 CFR 63.7750)**

6. The permittee shall submit all semiannual compliance reports and semiannual reports of monitoring and deviations from any emissions limitation or operation and maintenance requirement as required by 40 CFR 63.7751(a), (b), and (d). **(40 CFR 63.7751 (a), (b), and (d))**

7. If a startup, shutdown, or malfunction occurs during the semiannual reporting period, that is not consistent with the SSMP, the permittee shall submit an immediate SSM report according to the requirements of 40 CFR 63.10(d)(5)(ii). **(40 CFR 63.10(d)(5)(ii), 40 CFR 63.7751(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-MP	42[2]	118[2]	**40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR, Part 63, Subpart A and Subpart EEEEE for Iron and Steel Foundries by the compliance date. **(40 CFR Part 63, Subparts A and EEEEE)**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-MCS-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Consists of the automated mold cooling conveyors and automated sand shakeout lines, including a flat deck shakeout system. Emissions from these processes are controlled by associated hoods, enclosures, ductwork, a baghouse, and a regenerative thermal oxidizer. The exhaust gas flow from this unit is approximately 61,200 acfm.

Flexible Group ID: FG-NEWFOUNDRY-S1, FGCAM_UNITS-S1

POLLUTION CONTROL EQUIPMENT

Emissions from these processes are controlled by associated hoods, enclosures, ductwork, a baghouse, and a regenerative thermal oxidizer. The exhaust gas flow from this unit is approximately 61,200 acfm.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Volatile Organic HAP (VOHAP)	A flow-weighted average of 20 ppmv[2]	Test Protocol	EU-MCS-S1	SC IV.2, V.1, VI.1 - VI.3	**40 CFR 63.7690(a)(10)**
2. PM10	2.47 pph[2]	Test Protocol	EU-MCS-S1	SC V.2	**40 CFR 52.21(j)**
3. VOC	15.49 pph[2]	Test Protocol	EU-MCS-S1	SC V.2	**40 CFR 52.21(j)**
4. CO	62.70 pph[2]	Test Protocol	EU-MCS-S1	SC V.2	**40 CFR 52.21(j)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-MCS-S1 unless the associated capture system, regenerative thermal oxidizer (RTO) and baghouse control system are installed, operated and maintained in accordance with the approved operation and maintenance (O&M) plan.[2] **(R 336.1224, R 336.1225, R 336.1910, 40 CFR 52.21(j), 40 CFR 63.6(e)(1)(i), 40 CFR 63.7690(b), 40 CFR 63.7710)**

2. If the permittee installs a CEMS in order to monitor compliance with the VOHAP limit in 40 CFR 63.7690(a), the CEMS and appropriate flow meters shall be installed at a location(s) such that the monitor(s) will provide the VOHAP concentration of the automated pallet (mold) cooling line and automated shakeout lines (as defined in 40 CFR 63.7765) separate from any dilution caused by air flow captured from equipment that is not associated with the automated pallet (mold) cooling line and automated shakeout lines.[2] **(40 CFR 63.7741(g), 40 CFR 63.7690(a)(10), 40 CFR 63.7732(f))**

3. The permittee shall install, calibrate, maintain and operate in a satisfactory manner a temperature monitoring device in the combustion chamber of the RTO to monitor and record the temperature on a continuous basis, during operation of EU-MCS-S1. The proper operation of the RTO is maintaining the combustion temperature at or above the minimum combustion temperature established during the most recent performance test that demonstrates compliance with the VOHAP emission standard in SC I.1. The permittee shall revise the approved O & M plan to include the minimum RTO combustion temperature based on the most recent performance test that demonstrates compliance with the VOHAP emission standard in SC I.1.[2] **(R 336.1205, R 336.1225, R 336.1299, R 336.1702)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee must conduct subsequent performance tests to demonstrate compliance with the applicable VOHAP emissions limitations in § 63.7690(a)(10) for EU-MCS-S1 no less frequently than every 5 years and each time you elect to change an operating limit or to comply with a different alternative emissions limit, if applicable. The requirement to conduct performance tests every 5 years does not apply to an emissions source for which a continuous emissions monitoring system (CEMS) is used to demonstrate continuous compliance. **(40 CFR 63.7731(a))**

2. Within 180 days of permit issuance, the permittee shall verify PM-10, VOC and CO emission rates from EU-MCS-S1 by testing at owner's expense, in accordance with Department requirements. The permittee shall conduct subsequent compliance testing to demonstrate compliance with all applicable emission limits (PM10, VOC, CO) no less frequently than every 5 years. This requirement does not apply if a CEMS is used to demonstrate continuous compliance.[2] **(40 CFR 63.7731(a), R 336.1213(3))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall install, operate, and maintain a CEMS in accordance with Appendix 3-S1.[2]

2. The permittee shall monitor at all times the 3-hour average VOHAP concentration using a CEMS according to the requirements of 40 CFR 63.7741(g) when EU-MCS-S1 is operating.[2] **(40 CFR 63.7740(g))**

3. The permittee may request an alternative monitoring method to demonstrate compliance with the VOHAP emission limit according to the procedures in 40 CFR 63.7747.[2] **(40 CFR 63.7747)**

4. The permittee shall monitor and keep records, in a satisfactory manner, of the MCS capture system baghouse fan amperage for the capture system for EU-MCS-S1 as defined in Section 4.2 of the facility MACT Operations and Maintenance Plan. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1205, R 336.1225, R 336.1702(a))**

5. The permittee shall install, calibrate, maintain and operate in a satisfactory manner a gauge to monitor and record the pressure drop across the EU-MCS-S1 baghouse on a continuous basis when the EU-MCS-S1 is operating.[2] **(R 336.1205, R 336.1224, R 336.1225, R 336.1301, R 336.1331, R 336.1901, R 336.1910, 40 CFR 52.21(j))**

See Appendix 3-S1

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. The permittee shall report each instance in which each emission limitation, each work practice standard, and each operation and maintenance requirement was not met, in accordance with the requirements of 40 CFR 63.7751. **(40 CFR 63.7746, 40 CFR 63.7751)**

5. The permittee shall submit applicable notifications specified in 40 CFR 63.6(h)(4) and (5), 40 CFR 63.7(b) and (c), 63.8(e), 63.8(f)(4) through (6), and 63.9(d) through (h) for a notification of intent to conduct a performance test, and a notification of compliance status as specified in 40 CFR 63.7750. **(40 CFR 63.7750)**

6. The permittee shall submit all semiannual compliance reports and semiannual reports of monitoring and deviations from any emissions limitation or operation and maintenance requirement as required by 40 CFR 63.7751(a), (b), and (d). **(40 CFR 63.7751 (a), (b), and (d))**

7. If a startup, shutdown, or malfunction occurs during the semiannual reporting period, that is not consistent with the SSMP, the permittee shall submit an immediate SSM report according to the requirements of 40 CFR 63.10(d)(5)(ii). **(40 CFR 63.10(d)(5)(ii), 40 CFR 63.7751(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-MCS	60[2]	118[2]	**40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR, Part 63, Subpart A and Subpart EEEEE for Iron and Steel Foundries by the compliance date. **(40 CFR Part 63, Subparts A and EEEEE)**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-SS-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Consists of the molding machine and related sand handling equipment. Emissions from the mold making process are controlled by associated hoods, enclosures, ductwork, and a 56,900 acfm baghouse.

Flexible Group ID: FG-NEWFOUNDRY-S1, FGCAM_UNITS-S1

POLLUTION CONTROL EQUIPMENT

56,900 acfm baghouse

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. PM-10	2.30 pph[2]	Test Protocol	EU-SS-S1	SC V.1, V.2	**40 CFR 52.21 (j)**
2. VOC	4.00 pph[2]	Test Protocol	EU-SS-S1	SC V.1, V.2	**40 CFR 52.21 (j)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-SS-S1 unless the associated capture system and baghouse control system are installed, operated and maintained in accordance with the approved operation and maintenance (O&M) plan.[2] **(R 336.1224, R 336.1225, R 336.1910, 40 CFR 52.21(j))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. Within 180 days of permit issuance, the permittee shall verify PM-10, and VOC emission rates from EU-SS-S1 by testing at owner's expense, in accordance with Department requirements. No less than 30 days prior to testing, the permittee shall submit a complete test plan to the AQD. The AQD must approve the final plan prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test.[2] **(R 336.1205(1)(a) and (b), R 336.2001, R 336.2003, R 336.2004, 40 CFR 52.21(j))**

2. The permittee shall conduct subsequent compliance testing to demonstrate compliance with all applicable emission limits, no less frequently than every 5 years. This requirement does not apply if a CEMS is used to demonstrate continuous compliance.[2] **(R 336.2001, R 336.2003, R 336.2004, R 336.1213(3))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall install, calibrate, maintain and operate in a satisfactory manner a gauge to monitor and record the pressure drop across the EU-SS-S1 baghouse on a continuous basis when the baghouse is operating.[2] **(R 336.1205, R 336.1224, R 336.1225, R 336.1301, R 336.1331, R 336.1901, R 336.1910, 40 CFR 52.21(j))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-SS(NEW)	52[2]	118[2]	**40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-CCFBACK-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Consists of the back section of casting cooling conveyors and a shot blast machine. Emissions from this emission unit are controlled by associated hoods, enclosures, ductwork, and a 65,360 acfm baghouse.

Flexible Group ID: FG-NEWFOUNDRY-S1, FGCAM_UNITS-S1

POLLUTION CONTROL EQUIPMENT

The CCF2 baghouse – approximate flow of 65,360 acfm

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. PM-10	2.64 pph[2]	Test Protocol	EU-CCFBACK-S1	SC V.1, V.2	**40 CFR 52.21 (j)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-CCFBACK-S1 unless the associated capture system and baghouse control systems are installed and operating in accordance with the approved operation and maintenance (O&M) plan.[2] **(R 336.1224, R 336.1225, R 336.1910, 40 CFR 52.21(j))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. Within 180 days of permit issuance, the permittee shall verify PM-10 emission rate from the CCF2 Baghouse by testing at owner's expense, in accordance with Department requirements. No less than 30 days prior to testing, the permittee shall submit a complete test plan to the AQD. The AQD must approve the final plan prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test.[2] **(R 336.1205(1)(a) and (b), R 336.2001, R 336.2003, R 336.2004, 40 CFR 52.21(j))**

2. The permittee shall conduct subsequent compliance testing to demonstrate compliance with all applicable emission limits, no less frequently than every 5 years. This requirement does not apply if a CEMS is used to demonstrate continuous compliance.[2] **(R 336.2001, R 336.2003, R 336.2004, R 336.1213(3))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall install, calibrate, maintain and operate in a satisfactory manner a gauge to monitor and record the pressure drop across the CCF2 baghouse on a continuous basis when the baghouse is operating.[2] **(R 336.1205, R 336.1224, R 336.1225, R 336.1301, R 336.1331, R 336.1901, R 336.1910, 40 CFR 52.21(j))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-CCF2	54[2]	118[2]	**40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-EMERGEN1-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Diesel fired emergency power generator for the new foundry.

Flexible Group ID: NA

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. HC	1.0 g/HP-hr	Test Protocol	EU-EMERGEN1-S1	SC V.1 or VI.2	**40 CFR 60.4205**
2. NOx	6.9 g/HP-hr	Test Protocol	EU-EMERGEN1-S1	SC V.1 or VI.2	**40 CFR 60.4205**
3. CO	8.5 g/HP-hr	Test Protocol	EU-EMERGEN1-S1	SC V.1 or VI.2	**40 CFR 60.4205**
4. PM	0.40 g/HP-hr	Test Protocol	EU-EMERGEN1-S1	SC V.1 or VI.2	**40 CFR 60.4205**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Diesel Fuel	Sulfur content shall not exceed 15 ppm	Instantaneous	EU-EMERGEN1-S1	SC VI.3	**40 CFR 60.4207(b), 40 CFR 80.510(b)**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall operate EU-EMERGEN1-S1 in compliance with the emission limitations and operating limitations in this subpart. EU-EMERGEN1-S1 must be operated and maintained at any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. **(40 CFR 63.6605, 40 CFR 60.4206)**

2. The permittee shall maintain and operate EU-EMERGEN1-S1 per the manufacturer's emission related written instructions or develop a maintenance plan which must provide for the maintenance and operation of the engine in a manner consistent with good air pollution control practices for minimizing emissions. **(40 CFR 63.6640(a), 40 CFR 60.4211(a)(1))**

3. The permittee is not limited on hours of operation of EU-EMERGEN1-S1 during emergency situations. **(40 CFR 63.6640(f)(1)(i))**

4. The permittee shall not exceed 100 hours per year for maintenance checks and readiness testing. The permittee may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency RICE beyond 100 hours per year. **(40 CFR 63.6640(f)(1)(ii))**

5. The permittee may operate EU-EMERGEN1-S1 up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing, as allowed in 40 CFR 63.6640(f)(1)(iii). **(40 CFR 63.6640(f)(1)(iii))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-EMERGEN1-S1 unless a non-resettable hour meter to track the number of operational hours is installed and operating properly. **(R 336.1213(3), 40 CFR 60.4211(a))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. Within 180 days after issuance of this permit, the permittee shall verify HC, NOx, CO, and PM emission rates from EU-EMERGEN1-S1, by testing at owner's expense, in accordance with Department requirements or by providing manufacturer's certification documentation as required in SC VI.2. If testing is to be performed, the permittee must submit a complete stack-testing plan to the AQD. No less than 60 days prior to testing, the permittee must submit a complete stack-testing plan to the AQD. The AQD must approve the final plan prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test. **(R 336.2001, R 336.2003, R 336.2004, 40 CFR 60.4211)**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall keep in a satisfactory manner, records of hours of operation recorded through the non-resettable hour meter. The permittee shall document how many hours were spent during emergency operation, non-emergency operation and demand response operation. The permittee shall keep all records on file and make them available to the department upon request. **(R 336.1213(3), 40 CFR 60.4214(b))**

2. The permittee shall keep, in a satisfactory manner, a record of testing required in SC V.1 or manufacturer's certification documentation indicating that EU-EMERGEN1-S1 meets the applicable emission limitations contained in the federal Standards of Performance for New Stationary Sources 40 CFR Part 60 Subpart IIII. The permittee shall keep all records on file and make them available to the Department upon request. **(40 CFR 60.4211)**

3. The permittee shall keep, in a satisfactory manner, fuel supplier certification records or fuel sample test data, for each delivery of diesel fuel oil used in EU-EMERGEN1-S1, demonstrating that the fuel sulfur content meets the requirement of 40 CFR 80.510(b). The certification or test data shall include the name of the oil supplier or laboratory, and the sulfur content of the fuel oil. **(40 CFR 60.4207(a), 40 CFR 80.510(b))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SVEMERGEN1	NA	NA	NA

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the federal Standards of Performance for New Stationary Sources as set forth in 40 CFR Part 60 Subpart A and Subpart IIII. **(40 CFR Part 60 Subpart A and Subpart IIII)**

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-EMERGEN2-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Natural gas fired emergency power generator for the existing foundry.

Flexible Group ID: NA

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The EU-EMERGEN2-S1 shall be installed, maintained, and operated in a satisfactory manner. A list of recommended work practice standards as specified in 40 CFR 63.6602 and Table 2c, Item 1 or the permittee may petition the Administrator pursuant to the requirements of 40 CFR 63.6(g) for alternative work practices. The following are the recommended work practices specified in 40 CFR Part 63, Subpart ZZZZ, Table 2c:
   a. Change oil and filter every 500 hours of operation or annually, whichever comes first, except as allowed in Condition III.3; and
   b. Inspect the spark plugs every 1,000 hours of operation or annually, whichever comes first; and
   c. Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.

   If EU-EMERGEN2-S1 is being operated during an emergency and it is not possible to shut down the engine to perform the work practice standards on the schedule required the work practice standard can be delayed until the emergency is over. The work practice should be performed as soon as practicable after the emergency has ended or the unacceptable risk under Federal, State or local law has been abated. Sources must report any failure to perform the work practice on the schedule required and the Federal, State or local law or which the risk was deemed unacceptable. **(40 CFR 63.6602, 40 CFR Part 63, Subpart ZZZZ, Table 2c, Item 1)**

2. The permittee shall operate EU-EMERGEN2-S1 in compliance with the emission limitations and operating limitations in this subpart. EU-EMERGEN2-S1 must be operated and maintained at any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. **(40 CFR 63.6605)**

3. The permittee may utilize an oil analysis program in order to extend the specified oil change requirement. The oil analysis must be performed at the same frequency as oil changes are required. The oil analysis program must analyze the parameters and keep records as required in 40 CFR 63.6625(j). **(40 CFR 63.6625(j))**

4. The permittee shall maintain and operate EU-EMERGEN2-S1 per the manufacturer's emission related written instructions or develop a maintenance plan which must provide for the maintenance and operation of the engine in a manner consistent with good air pollution control practices for minimizing emissions. **(40 CFR 63.6625(e), 40 CFR 63.6640(a), 40 CFR Part 63, Subpart ZZZZ, Table 6, Item 9)**

5. The permittee shall minimize the time spent at idle during startup and minimize the startup time of EU-EMERGEN2-S1 to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which time the emission standards applicable to all times other than startup apply. **(40 CFR 63.6625(h))**

6. The permittee is not limited on hours of operation of EU-EMERGEN2-S1 during emergency situations. **(40 CFR 63.6640(f)(i))**

7. The permittee shall not exceed 100 hours per year for maintenance checks and readiness testing. The permittee may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency RICE beyond 100 hours per year. **(40 CFR 63.6640(f)(ii))**

8. The permittee may operate EU-EMERGEN2-S1 up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing, as allowed in 40 CFR 63.6640(f)(iii). **(40 CFR 63.6640(f)(iii))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-EMERGEN2-S1 unless a non-resettable hour meter to track the number of operational hours is installed and operating properly. **(40 CFR 63.6625(f))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee has the option of utilizing an oil analysis program in order to extend the specified oil change requirement in Table 2c of this subpart. If this option is utilized, the oil analysis must be performed at the same frequency specified for changing the oil listed in Table 2c. The analysis program must at a minimum analyze the following three parameters: Total Acid Number, viscosity, and percent water content. The condemning limits for these parameters are as follows: Total Acid Number increases by more than 3.0 milligrams of potassium hydroxide (KOH) per gram from Total Acid Number of the oil when new; viscosity of the oil has changed by more than 20 percent from the viscosity of the oil when new; or percent water content (by volume) is greater than 0.5. If all of these condemning limits are not exceeded, the permittee is not required to change the oil. If any of the limits are exceeded, the permittee must change the oil within 2 days of receiving the results of the analysis; if the engine is not in operation when the results of the analysis are received, the permittee must change the oil within 2 days or before commencing operation, whichever is later. The permittee must keep records of the parameters that are analyzed as part of the program, the results of the analysis, and the oil changes for the engine. The analysis program must be part of the maintenance plan for the engine. **(40 CFR 63.6625(j))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall keep in a satisfactory manner, records of the occurrence and duration of each malfunction of operation or the air pollution control monitoring equipment. The permittee shall keep all records on file and make them available to the department upon request. **(40 CFR 63.6655(a)(2), 40 CFR 63.6660)**

2. The permittee shall keep in a satisfactory manner, records of actions taken during periods of malfunction to minimize emissions, including corrective actions to restore malfunctioning process and air pollution control and monitoring equipment to its normal or usual manner of operation. The permittee shall keep all records on file and make them available to the department upon request. **(40 CFR 63.6655(a)(5), 40 CFR 63.6660)**

3. The permittee shall keep in a satisfactory manner, records to demonstrate continuous compliance with operating limitations in SC III.1. The permittee shall keep all records on file and make them available to the department upon request. **(40 CFR 63.6655(d), 40 CFR 63.6660)**

4. The permittee shall keep in a satisfactory manner, records of the maintenance conducted to demonstrate the engine and after-treatment control device (if any) were operated and maintained according to the developed maintenance plan. The permittee shall keep all records on file and make them available to the department upon request. **(40 CFR 63.6655(e), 40 CFR 63.6660)**

5. The permittee shall keep in a satisfactory manner, records of hours of operation recorded through the non-resettable hour meter. The permittee shall document how many hours were spent during emergency operation and how many hours were spent during non-emergency operation. If the engines were used for demand response operation, the permittee shall keep records of the notification of the emergency situation and the time the engine was operated as part of demand response. The permittee shall keep all records on file and make them available to the department upon request. **(40 CFR 63.6655(f), 40 CFR 63.6660)**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SVEMERGEN2	NA	NA	NA

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable requirements of the federal National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines as set forth in 40 CFR Part 63, Subparts A and ZZZZ. **(40 CFR Part 63, Subparts A and ZZZZ)**

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

D. FLEXIBLE GROUP CONDITIONS

Part D outlines the terms and conditions that apply to more than one emission unit. The permittee is subject to the special conditions for each flexible group in addition to the General Conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply, NA (not applicable) has been used in the table. If there are no special conditions that apply to more than one emission unit, this section will be left blank.

FLEXIBLE GROUP SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FGFOUNDRY-S1-S1	Flexible group that includes two emissions units.	EUMPCC-S1 EUSANDSYSTEM-S1
FG-COLDCLEANERS-S1	Any cold cleaner that is grandfathered or exempt from Rule 201, pursuant to Rule 281(h) or Rule 285(r)(iv). Existing cold cleaners were placed into operation prior to July 1, 1979. New cold cleaners were placed into operation on or after July 1, 1979.	EUCOLDCLEANER-S1
FG-RULE290-S1	Any emission unit that emits air contaminants and is exempt from the requirements of Rule 201, pursuant to Rules 278 and 290.	EUCONVEYOR-S1
FGCAM_UNITS-S1	The equipment in this flexible group is subject to Compliance Assurance Monitoring, 40 CFR 64.6.	EUMPCC-S1 EUSANDSYSTEM-S1 EU-MCS-S1 EU-SS-S1 EU-CCFBACK-S1
FG-NEWFOUNDRY-S1	All emission units of the new expansion foundry.	EU-MP-S1 EU-MCS-S1 EU-SS-S1 EU-CCFBACK-S1
FG-COATING-S1	Three GEOMET paint line systems each consisting of a mixing room, a paint spray booth equipped with HVLP applications and dry filter overspray control, and an induction cure process consisting of pre-curing and final cure steps for coating of metallic surfaces.	EULine1-S1 EULine2-S1 EULine3-S1
FG-SOURCE-S1	All metallic surface coating lines and all associated purge and cleanup operations at the stationary source. This includes any metallic surface coating line covered by this or any other general permit or any permit to install issued pursuant to Rule 201, and any metallic surface coating line exempt from the requirement to obtain a PTI pursuant to Rule 287 and/or Rule 290.	NA

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FG-MACT MMMM-S1	Each new, reconstructed, and existing affected source described in 40 CFR 63.3881(a)(1), including the subcategories listed in 40 CFR, Part 63, Subpart MMMM, 40 CFR 63.3881(a)(2) through (6), meeting the applicability requirements of 40 CFR 63.3881(b), which is engaged in the surface coating of miscellaneous metal parts and products. The affected source includes the collection of all the items listed in 40 CFR 63.3882(b)(1) through (4). Surface coating is defined by 40 CFR 63.3881, as the application of coating to a substrate using, for example, spray guns or dip tanks. Surface coating also includes associated activities, such as surface preparation, cleaning, mixing, and storage if they are directly related to the application of the coating. The 40 CFR, Part 63, Subpart MMMM, does not apply to surface coating or a coating operation that meets any of the criteria of 40 CFR 63.3881(c)(1) through (17).	EULine1-S1 EULine2-S1 EULine3-S1

FGFOUNDRY-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Flexible group that includes two emission units.

Emission Units: EUMPCC-S1, EUSANDSYSTEM-S1

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Particulate Matter	19.4 tons per year[2]	12-month rolling time period	EUMPCC-S1, EUSANDSYSTEM-S1	SC VI.2	**R 336.1205(3)**
2. Carbon Monoxide	156.0 tons per year[2]	12-month rolling time period	EUMPCC-S1, EUSANDSYSTEM-S1	SC VI.2	**R 336.1205(3)**
3. Volatile Organic Compounds	38.4 tons per year[2]	12-month rolling time period	EUMPCC-S1, EUSANDSYSTEM-S1	SC VI.2	**R 336.1205(3), R 336.1702(a)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Metal	Metal melt rate shall not exceed 48,000 tons per year.[2]	Based on a 12-month rolling time period as determined at the end of each calendar month.	EUMPCC-S1, EUSANDSYSTEM-S1	SC VI.1	**R 336.1205(1) and (3), R 336.1225, R 336.1702(a)**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall not operate FGFOUNDRY-S1 for more than 7,872 hours per 12-month rolling time period as determined at the end of each calendar month.[2] **(R 336.1205(1)(a) and (3), R 336.1225, R 336.1702(a))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall monitor in a satisfactory manner the metal melt rate and hours of operation for FGFOUNDRY-S1 on a monthly basis.[2] **(R 336.1205(1)(a) and (3), R 336.1225, R 336.1702(a))**

2. The permittee shall keep the following information on a monthly basis for FGFOUNDRY-S1:
   a. Tons of metal processed.
   b. Hours of operation.
   c. Monthly and previous 12-month PM, CO, and VOC emission rates, calculated as follows. Monthly PM emissions from each baghouse shall be calculated by multiplying the PM emission rate (in pph) measured during the most recent stack test with the monthly operation hours. The sum of PM emissions from both baghouses divided by 2000 will determine the monthly total PM emissions in tons per month. This monthly PM emission rate will be added to the preceding 11-month total PM emission rate to determine a 12-month rolling emission rate (in tpy).

      Monthly CO and VOC emission rates shall be calculated using the following emission factors:

      EUMPCC-S1:
      5.75 lb CO/ton of melt
      1.00 lb VOC/ton of melt

      EUSANDSYSTEM-S1:
      0.75 lb CO/ton of melt
      0.60 lb VOC/ton of melt

      Monthly melt rates shall be multiplied with the appropriate factors from above to determine the monthly CO and VOC mass emissions from each baghouse. The sum of CO and the sum of VOC emissions from both baghouses divided by 2000 will determine the monthly total CO and VOC emissions in tons per month, respectively. These monthly emission rates will be added to the previous 11-month total emission rates of each CO and VOC to determine 12-month rolling emission rates in tons per year for CO and VOC. [Note: Alternate CO and VOC emission factors may be used upon prior approval from the District Supervisor].[2] **(R 336.1205(1) and (3), R 336.1225, R 336.1702(a))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
NA	NA	NA	NA

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-COLDCLEANERS-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Any cold cleaner that is grandfathered or exempt from Rule 201 pursuant to Rule 278 and Rule 281(h), or Rule 285(r)(iv). Existing cold cleaners were placed into operation prior to July 1, 1979. New cold cleaners were placed into operation on or after July 1, 1979.

Emission Unit: EUCOLDCLEANER-S1

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

NA

II. MATERIAL LIMIT(S)

1. The permittee shall not use cleaning solvents containing more than five percent by weight of the following halogenated compounds: methylene chloride, perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, chloroform, or any combination thereof. **(R 336.1213(2))**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. Cleaned parts shall be drained for no less than 15 seconds or until dripping ceases. **(R 336.1611(2)(b), R 336.1707(3)(b))**

2. The permittee shall perform routine maintenance on each cold cleaner as recommended by the manufacturer. **(R 336.1213(3))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The cold cleaner must meet one of the following design requirements:
   a. The air/vapor interface of the cold cleaner is no more than ten square feet. **(R 336.1281(h))**
   b. The cold cleaner is used for cleaning metal parts and the emissions are released to the general in-plant environment. **(R 336.1285(r)(iv))**

2. The cold cleaner shall be equipped with a device for draining cleaned parts. **(R 336.1611(2)(b), R 336.1707(3)(b))**

3. All new and existing cold cleaners shall be equipped with a cover and the cover shall be closed whenever parts are not being handled in the cold cleaner. **(R 336.1611(2)(a), R 336.1707(3)(a))**

4. The cover of a new cold cleaner shall be mechanically assisted if the Reid vapor pressure of the solvent is more than 0.3 psia or if the solvent is agitated or heated. **(R 336.1707(3)(a))**

5. If the Reid vapor pressure of any solvent used in a new cold cleaner is greater than 0.6 psia; or, if any solvent used in a new cold cleaner is heated above 120 degrees fahrenheit, then the cold cleaner must comply with at least one of the following provisions:
   a. The cold cleaner must be designed such that the ratio of the freeboard height to the width of the cleaner is equal to or greater than 0.7. **(R 336.1707(2)(a))**

b. The solvent bath must be covered with water if the solvent is insoluble and has a specific gravity of more than 1.0. **(R 336.1707(2)(b))**
c. The cold cleaner must be controlled by a carbon adsorption system, condensation system, or other method of equivalent control approved by the AQD. **(R 336.1707(2)(c))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. For each new cold cleaner in which the solvent is heated, the solvent temperature shall be monitored and recorded at least once each calendar week during routine operating conditions. **(R 336.1213(3))**

2. The permittee shall maintain the following information on file for each cold cleaner **(R 336.1213(3))**:
   a. A serial number, model number, or other unique identifier for each cold cleaner.
   b. The date the unit was installed, manufactured or that it commenced operation.
   c. The air/vapor interface area for any unit claimed to be exempt under Rule 281(h).
   d. The applicable Rule 201 exemption.
   e. The Reid vapor pressure of each solvent used.
   f. If applicable, the option chosen to comply with Rule 707(2).

3. The permittee shall maintain written operating procedures for each cold cleaner. These written procedures shall be posted in an accessible, conspicuous location near each cold cleaner. **(R 336.1611(3), R 336.1707(4))**

4. As noted in Rule 611(2)(c) and Rule 707(3)(c), if applicable, an initial demonstration that the waste solvent is a safety hazard shall be made prior to storage in non-closed containers. If the waste solvent is a safety hazard and is stored in non-closed containers, verification that the waste solvent is disposed of so that not more than 20 percent, by weight, is allowed to evaporate into the atmosphere shall be made on a monthly basis. **(R 336.1213(3), R 336.1611(2)(c), R 336.1707(3)(c))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

NA

IX. OTHER REQUIREMENT(S)

NA

FG-RULE 290-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Any emission unit that emits air contaminants and is exempt from the requirements of Rule 201, pursuant to Rules 278 and 290.

Emission Unit: EUCONVEYOR-S1

POLLUTION CONTROL EQUIPMENT

Baghouse

I. EMISSION LIMIT(S)

1. Each emission unit that emits only noncarcinogenic volatile organic compounds or noncarcinogenic materials which are listed in Rule 122(f) as not contributing appreciably to the formation of ozone if the total uncontrolled or controlled emissions of air contaminants are not more than 1,000 or 500 pounds per month, respectively. **(R 336.1290(a)(i))**

2. Each emission unit that the total uncontrolled or controlled emissions of air contaminants are not more than 1,000 or 500 pounds per month, respectively, and all the following criteria listed below are met **(R 336.1290(a)(ii))**:
   a. For noncarcinogenic air contaminants, excluding noncarcinogenic volatile organic compounds and noncarcinogenic materials which are listed in Rule 122(f) as not contributing appreciably to the formation of ozone, with initial threshold screening levels greater than or equal to 2.0 micrograms per cubic meter, the uncontrolled or controlled emissions shall not exceed 1,000 or 500 pounds per month, respectively. **(R 336.1290(a)(ii)(A))**
   b. For noncarcinogenic air contaminants, excluding noncarcinogenic volatile organic compounds and noncarcinogenic materials which are listed in Rule 122(f) as not contributing appreciably to the formation of ozone, with initial threshold screening levels greater than or equal to 0.04 microgram per cubic meter and less than 2.0 micrograms per cubic meter, the uncontrolled or controlled emissions shall not exceed 20 or 10 pounds per month, respectively. **(R 336.1290(a)(ii)(B))**
   c. For carcinogenic air contaminants with initial risk screening levels greater than or equal to 0.04 microgram per cubic meter, the uncontrolled or controlled emissions shall not exceed 20 or 10 pounds per month, respectively. **(R 336.1290(a)(ii)(C))**
   d. The emission unit shall not emit any air contaminants, excluding non-carcinogenic volatile organic compounds and noncarcinogenic materials which are listed in Rule 122(f) as not contributing appreciably to the formation of ozone, with an initial threshold screening level or initial risk screening level less than 0.04 microgram per cubic meter. **(R 336.1290(a)(ii)(D))**

3. Each emission unit that emits only noncarcinogenic particulate air contaminants and other air contaminants that are exempted under Rule 290(a)(i) and/or Rule 290(a)(ii), if all of the following provisions are met **(R 336.1290(a)(iii))**:
   a. The particulate emissions are controlled by an appropriately designed and operated fabric filter collector or an equivalent control system which is designed to control particulate matter to a concentration of less than or equal to 0.01 pound of particulate per 1,000 pounds of exhaust gases and which does not have an exhaust gas flow rate more than 30,000 actual cubic feet per minute. **(R 336.1290(a)(iii)(A))**
   b. The visible emissions from the emission unit are not more than five percent opacity in accordance with the methods contained in Rule 303. **(R 336.1290(a)(iii)(B))**
   c. The initial threshold screening level for each particulate air contaminant, excluding nuisance particulate, is more than 2.0 micrograms per cubic meter. **(R 336.1290(a)(iii)(C))**

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The provisions of Rule 290 apply to each emission unit that is operating pursuant to Rule 290. **(R 336.1290)**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall maintain records of the following information for each emission unit for each calendar month using the methods outlined in the DEQ, AQD Rule 290, Permit to Install Exemption Record form (EQP 3558) or an alternative format that is approved by the AQD District Supervisor **(R 336.1213(3))**:
   a. Records identifying each air contaminant that is emitted. **(R 336.1213(3))**
   b. Records identifying if each air contaminant is controlled or uncontrolled. **(R 336.1213(3))**
   c. Records identifying if each air contaminant is either carcinogenic or non-carcinogenic. **(R 336.1213(3))**
   d. Records identifying the ITSL and IRSL, if established, of each air contaminant that is being emitted under the provisions of Rules 290(a)(ii) and (iii). **(R 336.1213(3))**
   e. Material use and calculations identifying the quality, nature, and quantity of the air contaminant emissions in sufficient detail to demonstrate that the actual emissions of the emission unit meet the emission limits outlined in this table and Rule 290. **(R 336.1213(3), R 336.1290(c))**

2. The permittee shall maintain an inventory of each emission unit that is exempt pursuant to Rule 290. This inventory shall include the following information **(R 336.1213(3))**:
   a. The permittee shall maintain a written description of each emission unit as it is maintained and operated throughout the life of the emission unit. **(R 336.1290(b), R 336.1213(3))**
   b. For each emission unit that emits noncarcinogenic particulate air contaminants pursuant to Rule 290(a)(iii), the permittee shall maintain a written description of the control device, including the designed control efficiency and the designed exhaust gas flow rate**. (R 336.1213(3))**

3. For each emission unit that emits noncarcinogenic particulate air contaminants pursuant to Rule 290(a)(iii), the permittee shall perform a monthly visible emission observation of each stack or vent during routine operating conditions. This observation need not be performed using Method 9. The permittee shall keep a written record of the results of each observation. **(R 336.1213(3))**

See Appendix 4-S1

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

NA

IX. OTHER REQUIREMENT(S)

NA

FGCAM_UNITS-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

The equipment in this flexible group is subject to Compliance Assurance Monitoring, 40 CFR 64.6.

Emission Units: EUMPCC-S1, EUSANDSYSTEM-S1, EU-SS-S1, EU-MCS-S1, EU-CCFBACK-S1

POLLUTION CONTROL EQUIPMENT

1. EUMPCC-S1 Baghouse – approximate flow of 49,000 dscfm.
2. EUSANDSYSTEM-S1 Baghouse – approximate flow of 66,000 dscfm.
3. EU-SS-S1 Baghouse – approximate flow of 56,900 acfm.
4. EU-MCS-S1 Baghouse – approximate flow of 61,200 acfm.
5. EU-CCFBACK-S1 (CCF2) Baghouse – approximate flow of 65,360 acfm.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. If visible emissions are observed, the permittee shall initiate corrective action, beginning with an evaluation of the occurrence to determine the action necessary to correct the situation. **(40 CFR 64.7(d), 40 CFR 64.6(c))**

2. The permittee shall operate the baghouse's differential pressure in accordance with the CAM plan. If an excursion occurs outside of this range, the permittee shall initiate corrective action. **(40 CFR 64.7(d), 40 CFR 64.6(c))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall measure the pressure drop and take a daily reading as an indicator of proper operation of the dust collector for EU-SS-S1, EU-CCFBACK-S1, EU-MCS-S1. **(40 CFR 64.6(c)(1)(i and ii))**

2. The permittee shall perform a daily noncertified visual opacity observation as an indicator of proper operation of the dust collector for EUSANDSYSTEM-S1. **(40 CFR 64.6(c)(1)(i and ii))**

3. The permittee shall monitor the bag leak detection system on a continuous basis as an indicator of proper operation of the dust collector for EU-MCS-S1. **(40 CFR 64.6(c)(1)(i and ii))**

   An excursion is a departure from the indicator range listed in the facility's CAM plan. **(40 CFR 64.6(c)(2))**

4. Upon detecting an excursion or exceedance, the owner or operator shall restore operation of the pollutant-specific emissions unit (including the control device and associated capture system) to its normal or usual manner of operation as expeditiously as practicable in accordance with good air pollution control practices for minimizing emissions. The response shall include minimizing the period of any startup, shutdown or malfunction and taking any necessary corrective actions to restore normal operation and prevent the likely recurrence of the cause of an excursion or exceedance (other than those caused by excused startup or shutdown conditions). **(40 CFR 64.7(d))**

5. Except for, as applicable, monitoring malfunctions, associated repairs, and required quality assurance or control activities (including, as applicable, calibration checks and required zero and span adjustments), the owner or operator shall conduct all monitoring in continuous operation (or shall collect data at all required intervals) at all times that the pollutant-specific emissions unit is operating. Data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities shall not be used for purposes of this part, including data averages and calculations or fulfilling a minimum data availability requirement, if applicable. The owner or operator shall use all the data collected during all other periods in assessing the operation of the control device and associated control system. A monitoring malfunction is any sudden, in frequent, not reasonably preventable failure of the monitoring to provide valid data. Monitoring failures that are caused in part by poor maintenance or careless operation are not malfunctions. **(40 CFR 64.6(c)(3), 64.7(c))**

6. The permittee shall properly maintain the monitoring system, including keeping necessary parts for routine repair of the monitoring equipment. **(40 CFR 64.7(b))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. Each semiannual report of monitoring and deviations shall include summary information on the number, duration and cause of excursions and/or exceedances and the corrective actions taken. If there were no excursions and/or exceedances in the reporting period, then this report shall include a statement that there were no excursions and/or exceedances. **(40 CFR 64.9(a)(2)(i))**

5. Each semiannual report of monitoring and deviations shall include summary information on monitor downtime. If there were no periods of monitor downtime in the reporting period, then this report shall include a statement that there were no periods of monitor downtime. **(40 CFR 64.9(a)(2)(ii))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
NA	NA	NA	NA

IX. OTHER REQUIREMENTS

1. The permittee shall comply with all applicable requirements of 40 CFR Part 64. **(40 CFR Part 64)**

2. If the permittee identifies a failure to achieve compliance with an emission limitation or standard for which the approved monitoring did not provide an indication of an excursion or exceedance while providing valid data, or the results of compliance or performance testing document a need to modify the existing indicator ranges or designated conditions, the permittee shall promptly notify the AQD and, if necessary, submit a proposed modification to the CAM Plan to address the necessary monitoring changes. Such a modification may include, but is not limited to, reestablishing indicator ranges or designated conditions, modifying the frequency of conducting monitoring and collecting data, or the monitoring of additional parameters. **(40 CFR 64.7(e))**

FG-NEWFOUNDRY-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

All emission units of the new expansion foundry.

Emission Units: EU-MP-S1, EU-MCS-S1, EU-SS-S1, EU-CCFBACK-S1

POLLUTION CONTROL EQUIPMENT

Baghouses

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Opacity	20% 6-min average, except for one 6-min average per hour that does not exceed 27%[2]	Test Protocol	Buildings or Structures Housing Emission Source at FG-NEWFOUNDRY-S1	SC III.1, III.2, III.3, V.I, VI.1 - VI.7	**40 CFR 63.7690(a)(7)**
2. PM-10	27.0 tpy[2]	12-Month Rolling Time Period	FG-NEWFOUNDRY-S1	SC VI.8	**40 CFR 52.21 (j)**
3. CO	375.5 tpy[2]	12-Month Rolling Time Period	FG-NEWFOUNDRY	SC VI.8	**40 CFR 52.21 (j)**
4. VOC	86.6 tpy[2]	12-Month Rolling Time Period	FG-NEWFOUNDRY-S1	SC VI.8	**40 CFR 52.21 (j)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Metal	115,500 tons per year[2]	12-month rolling time period	FG-NEWFOUNDRY-S1	SC VI.8	**40 CFR 52.21 (j)**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall maintain, in a format acceptable to the AQD District Supervisor, an operation and maintenance (O&M) plan for each capture and collection system and control device for an emission unit or flexible group subject to an emission limit as described in 40 CFR 63.7710. The plan shall include, but is not limited to, the following:
   a. Monthly inspections of the equipment that is important to the performance of the total capture system. **(40 CFR 63.7710(b)(1))**
   b. Operating limits for each capture system for an emission unit subject to a limit for VOHAP. **(40 CFR 63.7710(b)(2))**
   c. Preventative maintenance plan for each control device, including a schedule. **(40 CFR 63.7710(b)(3))**
   d. A site-specific monitoring plan for each bag leak detection system. **(40 CFR 63.7710(b)(4))**
   e. Corrective action plan for each baghouse. **(40 CFR 63.7710(b)(5))**
   f. Procedures for igniting gases from mold vents unless it is determined that the mold vent gases are not ignitable, ignite automatically, or cannot be ignited due to accessibility or safety issues. **(40 CFR 63.7710(b)(6))**

The permittee shall maintain and implement the approved O&M plan at all times.[2] **(40 CFR 63.7710, 40 CFR 63.7745)**

2. The permittee shall comply with the emission limits, work practice standards, and operation and maintenance requirements at all times, except during periods of startup, shutdown, or malfunction.[2] **(40 CFR 63.7720(a))**

3. The permittee shall develop and implement a written startup, shutdown and malfunction plan (SSMP) in accordance with 40 CFR 63.6(e)(3). This plan must address the startup, shutdown and corrective actions in the event of a malfunction of the emission capture system or the add-on control device. The permittee shall operate in accordance with the SSMP when applicable.[2] **(40 CFR 63.7720(c), 40 CFR 63.6(e)(3))**

4. For each segregated scrap storage area, bin or pile, the permittee shall prepare and operate at all times according to a written certification that the facility purchases and uses only charge material that does not include post-consumer automotive body scrap, post-consumer engine blocks, post-consumer oil filters, oily turnings, lead components, mercury switches, plastics or free organic liquids as specified in 40 CFR 63.7700 (b) –OR– the permittee shall prepare and operate according to an approved written plan for the selection and inspection of iron and steel scrap as specified in 40 CFR 63.7700(c).[2] **(40 CFR 63.7700(a), 40 CFR 63.7700(b), 40 CFR 63.7700(c))**

5. For each capture system subject to the VOHAP limit, the permittee shall establish site-specific operating limits in the O&M plans according to the procedures specified in 40 CFR 63.7733 (a).[2] **(40 CFR 63.7733 (a))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. Subsequent performance testing to demonstrate compliance with the opacity limit in 40 CFR 63.7690(a)(7) shall be conducted no less frequently than every 6 months. **(40 CFR 63.7730(a), 40 CFR 63.7731(b))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. During the period between the compliance date specified for FG-NEWFOUNDRY-S1 and the date when operating limits have been established during the performance test, the permittee shall maintain a log detailing the operation and maintenance of the process and control equipment.[2] **(40 CFR 63.7720(b))**

2. The permittee shall keep all records specified in 40 CFR 63.7752(a)(1) through (4), records for each CEMS as specified in 40 CFR 63.7752(b)(1) through (4) and records required by 40 CFR 63.7743, 40 CFR 63.7744, and 40 CFR 63.7745, as applicable.[2] **(40 CFR 63.7752)**

3. For the EU-MP-S1 baghouse that is applied to meet any PM or Total Metal HAP emission limit, the permittee shall install, operate, and maintain a bag leak detection system according to the requirements in 40 CFR 63.7741(b) and conduct inspections according to the requirements specified in 40 CFR 63.7740(b)(1) through (8).[2] **(40 CFR 63.7740(b), 40 CFR 63.7741(b))**

4. For each emission unit in FG-NEWFOUNDRY-S1, the permittee shall demonstrate initial compliance with the work practice standards and the operation and maintenance requirements as specified in 40 CFR 63.7735 and 40 CFR 63.7736.[2] **(40 CFR 63.7735, 40 CFR 63.7736)**

5. The permittee shall monitor and collect data to demonstrate continuous compliance in accordance with 40 CFR 63.7742.[2] **(40 CFR 63.7742)**

6. The permittee shall demonstrate continuous compliance with all applicable emission limitations in accordance with 40 CFR 63.7743.[2] **(40 CFR 63.7743)**

7. The permittee shall maintain records that document continuous compliance with the requirements of 40 CFR 63.7700(b) or (c) as specified in 40 CFR 63.7744(a).[2] **(40 CFR 63.7744 (a))**

8. The permittee shall keep the following information on a monthly basis for FG-NEWFOUNDRY-S1[2]:
   a. Tons of metal melted per month.
   b. Monthly and previous 12-month PM-10, CO, and VOC emission rates, calculated as follows:

      Monthly PM-10, CO and VOC emission rates shall be calculated using the following emission factors, or the emission factors established during the most recent tests, whichever is greater:

      EU-MP-S1:
      0.018 lb PM-10/ton of melt
      2.70 lb CO/ton of melt
      0.32 lb VOC/ton of melt

      EU-MCS-S1:
      0.15 lb PM-10/ton of melt
      3.80 lb CO/ton of melt
      0.94 lb VOC/ton of melt

      EU-SS-S1:
      0.14 lb PM-10/ton of melt
      0.24 lb VOC/ton of melt

      EU-CCFBACK-S1:
      0.16 lb PM-10/ton of melt

   Monthly melt rates shall be multiplied with the appropriate factors from above to determine the monthly PM-10, CO and VOC mass emissions from each baghouse. These monthly emission rates will be added to the previous 11-month total emission rates of each PM-10, CO and VOC to determine 12-month rolling emission rates in tons per year for PM-10, CO and VOC. [Note: Alternate CO and VOC emission factors may be used upon prior approval from the District Supervisor.]

   All records shall be kept on file for a period of at least five years and made available to the Department upon request.[2] **(R 336.1225, R 336.1702(a), 40 CFR 52.21(j))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. The permittee shall report each instance, as applicable, in which each emission limitation and/or operating limit specified in 40 CFR 63.7690, each work practice standard specified in 40 CFR 63.7700, and each operation and maintenance requirement specified in 40 CFR 63.7710 was not met, in accordance with the requirements of 40 CFR 63.7751.[2] **(40 CFR 63.7746, 40 CFR 63.7751)**

5. The permittee shall submit applicable notifications specified in 40 CFR 63.6(h)(4) and (5), 40 CFR 63.7(b) and (c), 63.8(e), 63.8(f)(4) and (6), and 63.9(b) through (h) for an initial notification, a notification of intent to conduct a performance test, and a notification of compliance status as specified in 40 CFR 63.7750.[2] **(40 CFR 63.7750)**

6. The permittee shall submit all semiannual compliance reports and semiannual reports of monitoring and deviations from any emissions limitation or operation and maintenance requirement as required by 40 CFR 63.7751(a), (b), and (d)[2]. **(40 CFR 63.7751 (a), (b), and (d))**

7. If a startup, shutdown, or malfunction occurs during the semiannual reporting period, that is not consistent with the SSMP, the permittee shall submit an immediate SSM report according to the requirements of 40 CFR 63.10(d)(5)(ii).[2] **(40 CFR 63.10(d)(5)(ii), 40 CFR 63.7751(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
NA	NA	NA	NA

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR, Part 63, Subpart A and Subpart EEEEE for Iron and Steel Foundries by the initial compliance date.[2] **(40 CFR Part 63, Subparts A and EEEEE)**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-COATING-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Three GEOMET paint line systems each consisting of a mixing room, a paint spray booth equipped with HVLP applications and dry filter overspray control, and an induction cure process consisting of pre-curing and final cure steps for coating of metallic surfaces.

Emission Units: EULine1-S1, EULine2-S1, EULine3-S1

POLLUTION CONTROL EQUIPMENT

Dry filter overspray control

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOC	2,000 pounds per month[2]	Calendar month	EULine1-S1, EULine2-S1, EULine3-S1, (Each line)	SC VI.3	**R 336.1225, R 336.1702(d)**
2. VOC	10 tpy[2]	12-month rolling time period as determined at the end of each calendar month	EULine1-S1, EULine2-S1, EULine3-S1, (Each line)	SC VI.3	**R 336.1225, R 336.1702(d)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall capture all purge/clean-up solvents and waste coatings from all coating applications used in FG-COATING-S1. The permittee shall store these materials in closed containers and shall dispose of them in an acceptable manner in compliance with all applicable state rules and federal regulations.[2] **(R 336.1702(d))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall equip and maintain FG-COATING-S1 with high volume-low pressure (HVLP) spray applicators or comparable technology with equivalent transfer efficiency (e.g., electrostatic spray, dip, flowcoat, roller, dip-spin). For HVLP applicators, the permittee shall keep test caps available for pressure testing.[2] **(R 336.1702(d))**

2. The permittee shall not operate any FG-COATING-S1 paint spray booth unless all respective exhaust filters are installed, maintained and operated in a satisfactory manner.[2] **(R 336.1224, R 336.1301, R 336.1331, R 336.1910)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. Within 60 days of notification by the AQD, verification of VOC emissions and VOC content (in pounds per gallon) of any coating, reducer or purge/clean-up solvent, as applied or as received, using federal Reference Test Method 25A, Method 24 or other EPA approved reference method, may be required for continued operation. Verification of the emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test. Upon prior written approval by the AQD District Supervisor, VOC content may alternatively be determined from manufacturer's formulation data. If the Method 25A or Method 24 should differ from the formulation values, the permittee shall use the Method 25A or Method 24 results to determine compliance.[2] **(R 336.2001, R 336.2003, R 336.2004, R 336.1702(d))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the last day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition.[2] **(R 336.1225, R 336.1702(d))**

2. The permittee shall maintain a current listing from the manufacturer of the chemical composition of each coating, including the weight percent of each component. The data may consist of Material Safety Data Sheets, manufacturer's formulation data, or both as deemed acceptable by the AQD District Supervisor. The permittee shall keep all records and make them available to the Department upon request.[2] **(R 336.1224, R 336.1225, R 336.1702(d))**

3. The permittee shall keep the following information on a calendar month basis for FG-COATING-S1:
   a. Purchase orders and invoices for all coatings, reducers, and purge/clean-up solvents.
   b. VOC content, in pounds per gallon, of each coating, reducer and purge/clean-up solvent used.
   c. Gallons of each coating, reducer and purge/clean-up solvent used and reclaimed.
   d. VOC mass emission calculations determining the monthly emission rate for each coating line in pounds per calendar month.
   e. VOC mass emission calculations determining the annual emission rate for each coating line, in tons per 12-month rolling time period as determined at the end of each calendar month.

   The permittee shall keep the records in a format acceptable to the AQD District Supervisor. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1225, R 336.1702(d))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. Within 30 days after completion of the installation, construction, reconstruction, relocation, or modification authorized by this PTI, the permittee or the authorized agent pursuant to Rule 204, shall notify the AQD District Supervisor, in writing, of the completion of the activity. Completion of the installation, construction, reconstruction, relocation, or modification is considered to occur not later than commencement of trial operation of FG-COATING-S1.[2] **(R 336.1201(7)(a))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-MixRoom1	8[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
2. SV-SprayBooth1	24[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
3. SV-InducCure1	24[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
4. SV-MixRoom2	8[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
5. SV-SprayBooth2	24[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
6. SV-InducCure2	24[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
7. SV-MixRoom3	8[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
8. SV-SprayBooth3	24[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
9. SV-InducCure3	24[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-SOURCE-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

All metallic surface coating lines and all associated purge and cleanup operations at the stationary source. This includes any metallic surface coating line covered by this or any other general permit or any PTI issued pursuant to Rule 201, and any metallic surface coating line exempt from the requirement to obtain a PTI pursuant to Rule 287 and/or Rule 290.

Emission Unit: NA

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOC	30 tpy[2]	Based on a 12-month rolling time period as determined at the end of each calendar month	FG-SOURCE-S1	SC VI.2	**R 336.1225 R 336.1702(d)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

See Appendix 5

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the last day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition.[2] **(R 336.1225, R 336.1702(d))**

2. The permittee shall keep VOC mass emission calculations, on a monthly basis for FG-SOURCE-S1 determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month, for all metallic surface coating lines and associated purge and clean-up operation at the source. The permittee shall keep the records in a format acceptable to the AQD District Supervisor. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1225, R 336.1702(d))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
NA	NA	NA	NA

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-MACT MMMM-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Each new, reconstructed, and existing affected source described in 40 CFR 63.3881(a)(1), including the subcategories listed in 40 CFR, Part 63, Subpart MMMM, 40 CFR 63.3881(a)(2) through (6), meeting the applicability requirements of 40 CFR 63.3881(b), which is engaged in the surface coating of miscellaneous metal parts and products. The affected source includes the collection of all the items listed in 40 CFR 63.3882(b)(1) through (4). Surface coating is defined by 40 CFR 63.3881 as the application of coating to a substrate using, for example, spray guns or dip tanks. Surface coating also includes associated activities, such as surface preparation, cleaning, mixing, and storage if they are directly related to the application of the coating. The 40 CFR, Part 63, Subpart MMMM, does not apply to surface coating or a coating operation that meets any of the criteria of 40 CFR 63.3881(c)(1) through (17).

Emission Units: EULine1-S1, EULine2-S1, EULine3-S1

POLLUTION CONTROL EQUIPMENT

Dry filter overspray control

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Organic HAP	1.9 lbs per gal of coating solids[2]	12-month rolling time period *	New or Reconstructed - General Use Coating	SC VI.1 through VI.5	**40 CFR 63.3890(a)(1)**
* As determined at the end of each calendar month.					

1. The permittee shall determine whether the organic HAP emission rate is equal to or less than the applicable emission limits in 40 CFR 63.3890 using at least one of the following three options, which are listed in 40 CFR 63.3891(a) through (c):
   a. Compliant material option,
   b. Emission rate without add-on controls option, or
   c. Emission rate with add-on controls option.

   The permittee shall include all coatings, thinners, and/or other additives, and cleaning materials used when determining the emission rate.[2] **(40 CFR 63.3891)**

2. Any coating operation(s) using the compliant material option or the emission rate without add-on controls option, shall be in compliance with the applicable emission limits in 40 CFR 63.3890 at all times.[2] **(40 CFR 63.3900(a)(1))**

3. If the surface coating operation(s) meet the applicability criteria of more than one of the subcategory emission limits specified in 40 CFR 63.3890(a) or (b), the permittee may comply separately with each subcategory emission limit, or comply using one of the alternatives in 40 CFR 63.3890(c)(1) or (2).[2] **(40 CFR 63.3890(c))**

II. MATERIAL LIMIT(S)

For the compliant materials option, the permittee shall meet the material limits specified in the following table.

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Each Thinner and/or Additive	No Organic HAP *[2]	Continuous	Each coating operation using compliant material option	SC VI.1, VI.2, VI.3, and VI.4	**40 CFR 63.3891(a)**
2. Each Cleaning Material	No Organic HAP *[2]	Continuous	Each coating operation using compliant material option	SC VI.1, VI.2, VI.3, and VI.4	**40 CFR 63.3891(a)**
* Determined according to 40 CFR 63.3941(a).					

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii), 40 CFR 63.3931)**

NA

See Appendix 5

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii), 40 CFR 63.3931)**

1. The permittee shall keep all records required by 40 CFR 63.3930 in the format and timeframes outlined in 40 CFR 63.3931.[2] **(40 CFR 63.3942(d), 40 CFR 63.3952(d), 40 CFR 63.3963(j))**

2. The permittee shall maintain, at a minimum, the following records for each compliance period[2]:
   a. A copy of each notification and report that is submitted to comply with Subpart MMMM, and the documentation supporting each notification and report. **(40 CFR 63.3930(a))**
   b. A current copy of information provided by materials suppliers or manufacturers, such as manufacturer's formulation data, or test data used to determine the mass fraction of organic HAP and density of each coating, thinner and/or other additive, and cleaning material, and the volume fraction of coating solids for each coating. **(40 CFR 63.3930(b))**
   c. A list of the coating operations on which each compliance option was used, and the beginning and ending dates and times for each compliance option used. **(40 CFR 63.3930(c)(1))**
   d. For the compliant materials option, the calculation of the organic HAP content for each coating, using Equation 2 of 40 CFR 63.3941. **(40 CFR 63.3930(c)(2))**
   e. For the emission rate without add-on controls option, the calculation of the total mass of organic HAP emissions for the coatings, thinners and/or additives, and cleaning materials used each month using Equations 1, 1A through 1C and 2 of 40 CFR 63.3951; and, if applicable, the calculation used to determine mass of organic HAP in waste materials according to 40 CFR 63.3951(e)(4); the calculation of the total volume of coating solids used each month using Equation 2 of 40 CFR 63.3951; and the calculation of each 12-month organic HAP emission rate using Equation 3 of 40 CFR 63.3951. **(40 CFR 63.3930(c)(3))**
   f. The name and mass or volume of each coating, thinner and/or other additive, and cleaning material used during each compliance period. If the compliant material option is used for all coatings at the affected

source, the permittee may maintain purchase records for each material used rather than a record of the volume used. **(40 CFR 63.3930(d))**

g. The mass fraction of organic HAP for each coating, thinner and/or additive, and cleaning material used during each compliance period unless the material is tracked by weight. **(40 CFR 63.3930(e))**

h. The volume fraction of coating solids for each coating used during each compliance period. **(40 CFR 63.3930(f))**

i. For either the emission rate without add-on controls option, the density of for each coating, thinner and/or other additive, and cleaning material used during each compliance period. **(40 CFR 63.3930(g))**

j. The information specified in 40 CFR 63.3930(h)(1) through (3), if an allowance is used in Equation 1 of 40 CFR 63.3951 for organic HAP contained in waste materials sent to or designated for shipment to a treatment, storage, and disposal facility (TSDF) according to 40 CFR 63.3951(e)(4). **(40 CFR 63.3930(h))**

k. The date, time, and duration of each deviation. **(40 CFR 63.3930(j))**

3. For each coating used for the compliant coating option, the permittee shall demonstrate continuous compliance with the emission limit in 40 CFR 63.3890, for each compliance period, using Equation 2 of 40 CFR 63.3941. For each thinner and cleaning material used, the permittee shall determine continuous compliance according to 40 CFR 63.3941(a).[2] **(40 CFR 63.3942)**

4. For any coating operation or group of coating operations using the emission rate without add-on controls option, the permittee shall demonstrate continuous compliance with the applicable organic HAP emission limit in 40 CFR 63.3890, for each compliance period, according to 40 CFR 63.3951(a) through (g).[2] **(40 CFR 63.3952)**

See Appendix 3-S1

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. For the compliant material option, if any coating used for any 12-month compliance period exceeds the applicable emission limit specified in 40 CFR 63.3890; or any thinner or cleaning material used contains any organic HAP, the permittee shall report this as a deviation as specified in 40 CFR 63.3910(c)(6) and 40 CFR 63.3920(a)(5).[2] **(40 CFR 63.3942(b))**

5. For the emission rate without add-on controls, if the organic HAP emission rate for any 12-month compliance period exceeds the applicable emission limit specified in 40 CFR 63.3890, the permittee shall report this as a deviation as specified in 40 CFR 63.3910(c)(6) and 40 CFR 63.3920(a)(6).[2]
(40 CFR 63.3952(b))

6. The permittee shall submit the applicable notifications specified in 40 CFR 63.7(b) and (c), 63.8(f)(4) and 63.9(b) through (e) and (h), an initial notification and a notification of compliance status as specified in 40 CFR 63.3910.[2] **(40 CFR Part 63, Subparts A and MMMM)**

7. The permittee shall submit all semiannual compliance reports specified in 40 CFR 63.3920(a). Each semiannual compliance report shall identify which coating operation(s) used each compliance option, and if there were no deviations from the emission limitations in 40 CFR 63.3890, include a statement that the coating operations were in compliance.[2] **(40 CFR 63.3920, 40 CFR 63.3942(c), 40 CFR 63.3952(c), 40 CFR 63.3963(f))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
NA	NA	NA	NA

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR, Part 63, Subpart A and Subpart MMMM for Surface Coating of Miscellaneous Metal Parts and Products by the initial compliance date.[2] **(40 CFR Part 63, Subparts A and MMMM)**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

E. NON-APPLICABLE REQUIREMENTS

At the time of the ROP issuance, the AQD has determined that no non-applicable requirements have been identified for incorporation into the permit shield provision set forth in the General Conditions in Part A pursuant to Rule 213(6)(a)(ii).

APPENDICES

Appendix 1-S1. Abbreviations and Acronyms

The following is an alphabetical listing of abbreviations/acronyms that may be used in this permit.

AQD	Air Quality Division	MM	Million
acfm	Actual cubic feet per minute	MSDS	Material Safety Data Sheet
BACT	Best Available Control Technology	MW	Megawatts
BTU	British Thermal Unit	NA	Not Applicable
°C	Degrees Celsius	NAAQS	National Ambient Air Quality Standards
CAA	Federal Clean Air Act	NESHAP	National Emission Standard for Hazardous Air Pollutants
CAM	Compliance Assurance Monitoring	NMOC	Non-methane Organic Compounds
CEM	Continuous Emission Monitoring	NOx	Oxides of Nitrogen
CFR	Code of Federal Regulations	NSPS	New Source Performance Standards
CO	Carbon Monoxide	NSR	New Source Review
COM	Continuous Opacity Monitoring	PM	Particulate Matter
department	Michigan Department of Environmental Quality	PM-10	Particulate Matter less than 10 microns in diameter
dscf	Dry standard cubic foot	pph	Pound per hour
dscm	Dry standard cubic meter	ppm	Parts per million
EPA	United States Environmental Protection Agency	ppmv	Parts per million by volume
EU	Emission Unit	ppmw	Parts per million by weight
°F	Degrees Fahrenheit	PS	Performance Specification
FG	Flexible Group	PSD	Prevention of Significant Deterioration
GACS	Gallon of Applied Coating Solids	psia	Pounds per square inch absolute
GC	General Condition	psig	Pounds per square inch gauge
gr	Grains	PeTE	Permanent Total Enclosure
HAP	Hazardous Air Pollutant	PTI	Permit to Install
Hg	Mercury	RACT	Reasonable Available Control Technology
hr	Hour	ROP	Renewable Operating Permit
HP	Horsepower	SC	Special Condition
H_2S	Hydrogen Sulfide	scf	Standard cubic feet
HVLP	High Volume Low Pressure *	sec	Seconds
ID	Identification (Number)	SCR	Selective Catalytic Reduction
IRSL	Initial Risk Screening Level	SO_2	Sulfur Dioxide
ITSL	Initial Threshold Screening Level	SRN	State Registration Number
LAER	Lowest Achievable Emission Rate	TAC	Toxic Air Contaminant
lb	Pound	Temp	Temperature
m	Meter	THC	Total Hydrocarbons
MACT	Maximum Achievable Control Technology	tpy	Tons per year
MAERS	Michigan Air Emissions Reporting System	µg	Microgram
MAP	Malfunction Abatement Plan	VE	Visible Emissions
MDEQ	Michigan Department of Environmental Quality	VOC	Volatile Organic Compounds
mg	Milligram	yr	Year
mm	Millimeter		

*For HVLP applicators, the pressure measured at the gun air cap shall not exceed 10 pounds per square inch gauge (psig).

Appendix 2-S1. Schedule of Compliance

The permittee certified in the ROP application that this stationary source is in compliance with all applicable requirements and the permittee shall continue to comply with all terms and conditions of this ROP. A Schedule of Compliance is not required. **(R 336.1213(4)(a), R 336.1119(a)(ii))**

Appendix 3-S1. Monitoring Requirements

The following monitoring procedures, methods, or specifications are the details to the monitoring requirements identified and referenced in EU-MCS-S1. See the following.

VOC Monitoring CEMS Requirements

1. Within 60 days of completion of testing, the permittee shall submit to the AQD two copies of the final report demonstrating the CEMS complies with the requirements of Performance Specification (PS) 8.

2. The span value shall be 2.0 times the lowest emission standard or as specified in the federal regulations.

3. The CEMS shall be installed, calibrated, maintained, and operated in accordance with the procedures set forth in 40 CFR, Part 60.13 and PS 8 of Appendix B to 40 CFR, Part 60.

4. Each calendar quarter, the permittee shall perform the Quality Assurance Procedures of the CEMS set forth in Appendix F of 40 CFR, Part 60. Within 30 days following the end of each calendar quarter, the permittee shall submit the results to the AQD in the format of the data assessment report (Figure 1, Appendix F).

Appendix 4-S1. Recordkeeping

Specific recordkeeping requirement formats and procedures are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 5-S1. Testing Procedures

Specific testing requirement plans, procedures, and averaging times are detailed in the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 6-S1. Permits to Install/ROP Revision Applications

The following table lists any PTIs issued or ROP Revision Applications received since the effective date of the previously issued ROP No. MI-ROP-N5814-2006. Those ROP revision applications that are being issued concurrently with this ROP renewal are identified by an asterisk (*). Those revision applications not listed with an asterisk were processed prior to this renewal.

Source-Wide PTI No. MI-PTI-N5814-2006 is being reissued as Source-Wide PTI No. MI-PTI-N5814-2015.

Permit to Install Number	ROP Revision Application Number	Description of Equipment or Change	Corresponding Emission Unit(s) or Flexible Group(s)
280-06A	Administrative Amendment application #200900035*	Installation and operation of a new foundry used to produce gray iron.	EU-MP-S1, EU-MCS-S1, EU-SS-S1, EU-CCFFRONT-S1, EU-CCFBACK-S1
177-11	Minor Modification application #201200036*	Installation of three new coating lines.	EULine1-S1, EULine2-S1, EULine3-S1
280-06B	Minor Modification application #201400006*	Installation of regenerative thermal oxidizer control equipment to control VOHAP emissions from EU-MCS-S1.	EU-MCS-S1, FG-NEWFOUNDRY-S1

Appendix 7-S1. Emission Calculations

The permittee shall use the following calculations in conjunction with monitoring, testing or recordkeeping data to determine compliance with the applicable requirements referenced in the SOURCE-WIDE table.

Table 7.1
Summary of HAPs emission factors from the MPCC and SS stacks

Pollutant	MPCC Stack	SS Stack
	lb/ton iron melt	lb/ton iron melt
Single HAP	0.07	0.21
(Benzene)		
Total HAPS	0.11	0.60

Appendix 8-S1. Reporting

A. Annual, Semiannual, and Deviation Certification Reporting

The permittee shall use the MDEQ, AQD, Report Certification form (EQP 5736) and MDEQ, AQD, Deviation Report form (EQP 5737) for the annual, semiannual and deviation certification reporting referenced in the Reporting Section of the Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Alternative formats must meet the provisions of Rule 213(4)(c) and Rule 213(3)(c)(i), respectively, and be approved by the AQD District Supervisor.

B. Other Reporting

Specific reporting requirement formats and procedures are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, Part B of this appendix is not applicable.

Section 2 – Gokoh Coldwater, Inc.

A. GENERAL CONDITIONS

Permit Enforceability

- All conditions in this permit are both federally enforceable and state enforceable unless otherwise noted. **(R 336.1213(5))**

- Those conditions that are hereby incorporated in a state-only enforceable Source-Wide PTI pursuant to Rule 201(2)(d) are designated by footnote one. **(R 336.1213(5)(a), R 336.1214a(5))**

- Those conditions that are hereby incorporated in a federally enforceable Source-Wide PTI pursuant to Rule 201(2)(c) are designated by footnote two. **(R 336.1213(5)(b), R 336.1214a(3))**

General Provisions

1. The permittee shall comply with all conditions of this ROP. Any ROP noncompliance constitutes a violation of Act 451, and is grounds for enforcement action, for ROP revocation or revision, or for denial of the renewal of the ROP. All terms and conditions of this ROP that are designated as federally enforceable are enforceable by the Administrator of the United States Environmental Protection Agency (USEPA) and by citizens under the provisions of the federal Clean Air Act (CAA). Any terms and conditions based on applicable requirements which are designated as "state-only" are not enforceable by the USEPA or citizens pursuant to the CAA. **(R 336.1213(1)(a))**

2. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this ROP. **(R 336.1213(1)(b))**

3. This ROP may be modified, revised, or revoked for cause. The filing of a request by the permittee for a permit modification, revision, or termination, or a notification of planned changes or anticipated noncompliance does not stay any ROP term or condition. This does not supersede or affect the ability of the permittee to make changes, at the permittee's own risk, pursuant to Rule 215 and Rule 216. **(R 336.1213(1)(c))**

4. The permittee shall allow the department, or an authorized representative of the department, upon presentation of credentials and other documents as may be required by law and upon stating the authority for and purpose of the investigation, to perform any of the following activities **(R 336.1213(1)(d))**:
   a. Enter, at reasonable times, a stationary source or other premises where emissions-related activity is conducted or where records must be kept under the conditions of the ROP.
   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the ROP.
   c. Inspect, at reasonable times, any of the following:
      i. Any stationary source.
      ii. Any emission unit.
      iii. Any equipment, including monitoring and air pollution control equipment.
      iv. Any work practices or operations regulated or required under the ROP.
   d. As authorized by Section 5526 of Act 451, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the ROP or applicable requirements.

5. The permittee shall furnish to the department, within a reasonable time, any information the department may request, in writing, to determine whether cause exists for modifying, revising, or revoking the ROP or to determine compliance with this ROP. Upon request, the permittee shall also furnish to the department copies of any records that are required to be kept as a term or condition of this ROP. For information which is claimed by the permittee to be confidential, consistent with the requirements of the 1976 PA 442, MCL §15.231 et seq., and known as the Freedom of Information Act, the person may also be required to furnish the records directly to the USEPA together with a claim of confidentiality. **(R 336.1213(1)(e))**

6. A challenge by any person, the Administrator of the USEPA, or the department to a particular condition or a part of this ROP shall not set aside, delay, stay, or in any way affect the applicability or enforceability of any other condition or part of this ROP. **(R 336.1213(1)(f))**

7. The permittee shall pay fees consistent with the fee schedule and requirements pursuant to Section 5522 of Act 451. **(R 336.1213(1)(g))**

8. This ROP does not convey any property rights or any exclusive privilege. **(R 336.1213(1)(h))**

Equipment & Design

9. Any collected air contaminants shall be removed as necessary to maintain the equipment at the required operating efficiency. The collection and disposal of air contaminants shall be performed in a manner so as to minimize the introduction of contaminants to the outer air. Transport of collected air contaminants in Priority I and II areas requires the use of material handling methods specified in Rule 370(2). **(R 336.1370)**

10. Any air cleaning device shall be installed, maintained, and operated in a satisfactory manner and in accordance with the Michigan Air Pollution Control rules and existing law. **(R 336.1910)**

Emission Limits

11. Unless otherwise specified in this ROP, the permittee shall comply with Rule 301, which states, in part, "Except as provided in subrules 2, 3, and 4 of this rule, a person shall not cause or permit to be discharged into the outer air from a process or process equipment a visible emission of a density greater than the most stringent of the following: **(R 336.1301(1))**
    a. A 6-minute average of 20 percent opacity, except for one 6-minute average per hour of not more than 27 percent opacity.
    b. A limit specified by an applicable federal new source performance standard.

    The grading of visible emissions shall be determined in accordance with Rule 303.

12. The permittee shall not cause or permit the emission of an air contaminant or water vapor in quantities that cause, alone or in reaction with other air contaminants, either of the following:
    a. Injurious effects to human health or safety, animal life, plant life of significant economic value, or property.[1] **(R 336.1901(a))**
    b. Unreasonable interference with the comfortable enjoyment of life and property.[1] **(R 336.1901(b))**

Testing/Sampling

13. The department may require the owner or operator of any source of an air contaminant to conduct acceptable performance tests, at the owner's or operator's expense, in accordance with Rule 1001 and Rule 1003, under any of the conditions listed in Rule 1001(1). **(R 336.2001)**

14. Any required performance testing shall be conducted in accordance with Rule 1001(2), Rule 1001(3) and Rule 1003. **(R 336.2001(2), R 336.2001(3), R 336.2003(1))**

15. Any required test results shall be submitted to the Air Quality Division (AQD) in the format prescribed by the applicable reference test method within 60 days following the last date of the test. **(R 336.2001(5))**

Monitoring/Recordkeeping

16. Records of any periodic emission or parametric monitoring required in this ROP shall include the following information specified in Rule 213(3)(b)(i), where appropriate **(R 336.1213(3)(b))**:
    a. The date, location, time, and method of sampling or measurements.
    b. The dates the analyses of the samples were performed.
    c. The company or entity that performed the analyses of the samples.
    d. The analytical techniques or methods used.
    e. The results of the analyses.
    f. The related process operating conditions or parameters that existed at the time of sampling or measurement.

17. All required monitoring data, support information and all reports, including reports of all instances of deviation from permit requirements, shall be kept and furnished to the department upon request for a period of not less than 5 years from the date of the monitoring sample, measurement, report or application. Support information includes all calibration and maintenance records and all original strip-chart recordings, or other original data records, for continuous monitoring instrumentation and copies of all reports required by the ROP. **(R 336.1213(1)(e), R 336.1213(3)(b)(ii))**

Certification & Reporting

18. Except for the alternate certification schedule provided in Rule 213(3)(c)(iii)(B), any document required to be submitted to the department as a term or condition of this ROP shall contain an original certification by a Responsible Official which states that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete. **(R 336.1213(3)(c))**

19. A Responsible Official shall certify to the appropriate AQD District Office and to the USEPA that the stationary source is and has been in compliance with all terms and conditions contained in the ROP except for deviations that have been or are being reported to the appropriate AQD District Office pursuant to Rule 213(3)(c). This certification shall include all the information specified in Rule 213(4)(c)(i) through (v) and shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the certification are true, accurate, and complete. The USEPA address is: USEPA, Air Compliance Data - Michigan, Air and Radiation Division, 77 West Jackson Boulevard, Chicago, Illinois 60604. **(R 336.1213(4)(c))**

20. The certification of compliance shall be submitted annually for the term of this ROP as detailed in the special conditions, or more frequently if specified in an applicable requirement or in this ROP. **(R 336.1213(4)(c))**

21. The permittee shall promptly report any deviations from ROP requirements and certify the reports. The prompt reporting of deviations from ROP requirements is defined in Rule 213(3)(c)(ii) as follows, unless otherwise described in this ROP. **(R 336.1213(3)(c))**
    a. For deviations that exceed the emissions allowed under the ROP, prompt reporting means reporting consistent with the requirements of Rule 912 as detailed in Condition 25. All reports submitted pursuant to this paragraph shall be promptly certified as specified in Rule 213(3)(c)(iii).
    b. For deviations which exceed the emissions allowed under the ROP and which are not reported pursuant to Rule 912 due to the duration of the deviation, prompt reporting means the reporting of all deviations in the semiannual reports required by Rule 213(3)(c)(i). The report shall describe reasons for each deviation and the actions taken to minimize or correct each deviation.
    c. For deviations that do not exceed the emissions allowed under the ROP, prompt reporting means the reporting of all deviations in the semiannual reports required by Rule 213(3)(c)(i). The report shall describe the reasons for each deviation and the actions taken to minimize or correct each deviation.

22. For reports required pursuant to Rule 213(3)(c)(ii), prompt certification of the reports is described in Rule 213(3)(c)(iii) as either of the following **(R 336.1213(3)(c))**:
    a. Submitting a certification by a Responsible Official with each report which states that, based on information and belief formed after reasonable inquiry, the statements and information in the report are true, accurate, and complete.
    b. Submitting, within 30 days following the end of a calendar month during which one or more prompt reports of deviations from the emissions allowed under the ROP were submitted to the department pursuant to Rule 213(3)(c)(ii), a certification by a Responsible Official which states that, "based on information and belief formed after reasonable inquiry, the statements and information contained in each of the reports submitted during the previous month were true, accurate, and complete". The certification shall include a listing of the reports that are being certified. Any report submitted pursuant to Rule 213(3)(c)(ii) that will be certified on a monthly basis pursuant to this paragraph shall include a statement that certification of the report will be provided within 30 days following the end of the calendar month.

23. Semiannually for the term of the ROP as detailed in the special conditions, or more frequently if specified, the permittee shall submit certified reports of any required monitoring to the appropriate AQD District Office. All instances of deviations from ROP requirements during the reporting period shall be clearly identified in the reports. **(R 336.1213(3)(c)(i))**

24. On an annual basis, the permittee shall report the actual emissions, or the information necessary to determine the actual emissions, of each regulated air pollutant as defined in Rule 212(6) for each emission unit utilizing the emissions inventory forms provided by the department. **(R 336.1212(6))**

25. The permittee shall provide notice of an abnormal condition, start-up, shutdown, or malfunction that results in emissions of a hazardous or toxic air pollutant which continue for more than one hour in excess of any applicable standard or limitation, or emissions of any air contaminant continuing for more than two hours in excess of an applicable standard or limitation, as required in Rule 912, to the appropriate AQD District Office. The notice shall be provided not later than two business days after the start-up, shutdown, or discovery of the abnormal conditions or malfunction. Notice shall be by any reasonable means, including electronic, telephonic, or oral communication. Written reports, if required under Rule 912, must be submitted to the appropriate AQD District Supervisor within 10 days after the start-up or shutdown occurred, within 10 days after the abnormal conditions or malfunction has been corrected, or within 30 days of discovery of the abnormal conditions or malfunction, whichever is first. The written reports shall include all of the information required in Rule 912(5) and shall be certified by a Responsible Official in a manner consistent with the CAA. **(R 336.1912)**

Permit Shield

26. Compliance with the conditions of the ROP shall be considered compliance with any applicable requirements as of the date of ROP issuance, if either of the following provisions is satisfied. **(R 336.1213(6)(a)(i), R 336.1213(6)(a)(ii))**
    a. The applicable requirements are included and are specifically identified in the ROP.
    b. The permit includes a determination or concise summary of the determination by the department that other specifically identified requirements are not applicable to the stationary source.

    Any requirements identified in Part E of this ROP have been identified as non-applicable to this ROP and are included in the permit shield.

27. Nothing in this ROP shall alter or affect any of the following:
    a. The provisions of Section 303 of the CAA, emergency orders, including the authority of the USEPA under Section 303 of the CAA. **(R 336.1213(6)(b)(i))**
    b. The liability of the owner or operator of this source for any violation of applicable requirements prior to or at the time of this ROP issuance. **(R 336.1213(6)(b)(ii))**
    c. The applicable requirements of the acid rain program, consistent with Section 408(a) of the CAA. **(R 336.1213(6)(b)(iii))**

d. The ability of the USEPA to obtain information from a source pursuant to Section 114 of the CAA. **(R 336.1213(6)(b)(iv))**

28. The permit shield shall not apply to provisions incorporated into this ROP through procedures for any of the following:
    a. Operational flexibility changes made pursuant to Rule 215. **(R 336.1215(5))**
    b. Administrative Amendments made pursuant to Rule 216(1)(a)(i)-(iv). **(R 336.1216(1)(b)(iii))**
    c. Administrative Amendments made pursuant to Rule 216(1)(a)(v) until the amendment has been approved by the department. **(R 336.1216(1)(c)(iii))**
    d. Minor Permit Modifications made pursuant to Rule 216(2). **(R 336.1216(2)(f))**
    e. State-Only Modifications made pursuant to Rule 216(4) until the changes have been approved by the department. **(R 336.1216(4)(e))**

29. Expiration of this ROP results in the loss of the permit shield. If a timely and administratively complete application for renewal is submitted not more than 18 months, but not less than 6 months, before the expiration date of the ROP, but the department fails to take final action before the end of the ROP term, the existing ROP does not expire until the renewal is issued or denied, and the permit shield shall extend beyond the original ROP term until the department takes final action. **(R 336.1217(1)(c), R 336.1217(1)(a))**

Revisions

30. For changes to any process or process equipment covered by this ROP that do not require a revision of the ROP pursuant to Rule 216, the permittee must comply with Rule 215. **(R 336.1215, R 336.1216)**

31. A change in ownership or operational control of a stationary source covered by this ROP shall be made pursuant to Rule 216(1). **(R 336.1219(2))**

32. For revisions to this ROP, an administratively complete application shall be considered timely if it is received by the department in accordance with the time frames specified in Rule 216. **(R 336.1210(9))**

33. Pursuant to Rule 216(1)(b)(iii), Rule 216(2)(d) and Rule 216(4)(d), after a change has been made, and until the department takes final action, the permittee shall comply with both the applicable requirements governing the change and the ROP terms and conditions proposed in the application for the modification. During this time period, the permittee may choose to not comply with the existing ROP terms and conditions that the application seeks to change. However, if the permittee fails to comply with the ROP terms and conditions proposed in the application during this time period, the terms and conditions in the ROP are enforceable. **(R 336.1216(1)(c)(iii), R 336.1216(2)(d), R 336.1216(4)(d))**

Reopenings

34. A ROP shall be reopened by the department prior to the expiration date and revised by the department under any of the following circumstances:
    a. If additional requirements become applicable to this stationary source with three or more years remaining in the term of the ROP, but not if the effective date of the new applicable requirement is later than the ROP expiration date. **(R 336.1217(2)(a)(i))**
    b. If additional requirements pursuant to Title IV of the CAA become applicable to this stationary source. **(R 336.1217(2)(a)(ii))**
    c. If the department determines that the ROP contains a material mistake, information required by any applicable requirement was omitted, or inaccurate statements were made in establishing emission limits or the terms or conditions of the ROP. **(R 336.1217(2)(a)(iii))**
    d. If the department determines that the ROP must be revised to ensure compliance with the applicable requirements. **(R 336.1217(2)(a)(iv))**

Renewals

35. For renewal of this ROP, an administratively complete application shall be considered timely if it is received by the department not more than 18 months, but not less than 6 months, before the expiration date of the ROP. **(R 336.1210(7))**

Stratospheric Ozone Protection

36. If the permittee is subject to Title 40 of the Code of Federal Regulations (CFR), Part 82 and services, maintains, or repairs appliances except for motor vehicle air conditioners (MVAC), or disposes of appliances containing refrigerant, including MVAC and small appliances, or if the permittee is a refrigerant reclaimer, appliance owner or a manufacturer of appliances or recycling and recovery equipment, the permittee shall comply with all applicable standards for recycling and emissions reduction pursuant to 40 CFR, Part 82, Subpart F.

37. If the permittee is subject to 40 CFR, Part 82, and performs a service on motor (fleet) vehicles when this service involves refrigerant in the MVAC, the permittee is subject to all the applicable requirements as specified in 40 CFR, Part 82, Subpart B, Servicing of Motor Vehicle Air Conditioners. The term "motor vehicle" as used in Subpart B does not include a vehicle in which final assembly of the vehicle has not been completed by the original equipment manufacturer. The term MVAC as used in Subpart B does not include the air-tight sealed refrigeration system used for refrigerated cargo or an air conditioning system on passenger buses using Hydrochlorofluorocarbon-22 refrigerant.

Risk Management Plan

38. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall register and submit to the USEPA the required data related to the risk management plan for reducing the probability of accidental releases of any regulated substances listed pursuant to Section 112(r)(3) of the CAA as amended in 40 CFR 68.130. The list of substances, threshold quantities, and accident prevention regulations promulgated under 40 CFR, Part 68, do not limit in any way the general duty provisions under Section 112(r)(1).

39. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall comply with the requirements of 40 CFR, Part 68, no later than the latest of the following dates as provided in 40 CFR 68.10(a):
    a. June 21, 1999,
    b. Three years after the date on which a regulated substance is first listed under 40 CFR 68.130, or
    c. The date on which a regulated substance is first present above a threshold quantity in a process.

40. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall submit any additional relevant information requested by any regulatory agency necessary to ensure compliance with the requirements of 40 CFR, Part 68.

41. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall annually certify compliance with all applicable requirements of Section 112(r) as detailed in Rule 213(4)(c)). **(40 CFR, Part 68)**

Emission Trading

42. Emission averaging and emission reduction credit trading are allowed pursuant to any applicable interstate or regional emission trading program that has been approved by the Administrator of the USEPA as a part of Michigan's State Implementation Plan. Such activities must comply with Rule 215 and Rule 216. **(R 336.1213(12))**

Permit To Install (PTI)

43. The process or process equipment included in this permit shall not be reconstructed, relocated, or modified unless a PTI authorizing such action is issued by the department, except to the extent such action is exempt from the PTI requirements by any applicable rule. [2] **(R 336.1201(1))**

44. The department may, after notice and opportunity for a hearing, revoke PTI terms or conditions if evidence indicates the process or process equipment is not performing in accordance with the terms and conditions of the PTI or is violating the department's rules or the CAA. [2] **(R 336.1201(8), Section 5510 of Act 451)**

45. The terms and conditions of a PTI shall apply to any person or legal entity that now or hereafter owns or operates the process or process equipment at the location authorized by the PTI. If a new owner or operator submits a written request to the department pursuant to Rule 219 and the department approves the request, this PTI will be amended to reflect the change of ownership or operational control. The request must include all of the information required by Subrules (1)(a), (b) and (c) of Rule 219. The written request shall be sent to the appropriate AQD District Supervisor, MDEQ. [2] **(R 336.1219)**

46. If the installation, reconstruction, relocation, or modification of the equipment for which PTI terms and conditions have been approved has not commenced within 18 months of the original PTI issuance date, or has been interrupted for 18 months, the applicable terms and conditions from that PTI, as incorporated into the ROP, shall become void unless otherwise authorized by the department. Furthermore, the person to whom that PTI was issued, or the designated authorized agent, shall notify the department via the Supervisor, Permit Section, MDEQ, AQD, P. O. Box 30260, Lansing, Michigan 48909, if it is decided not to pursue the installation, reconstruction, relocation, or modification of the equipment allowed by the terms and conditions from that PTI. [2] **(R 336.1201(4))**

Footnotes:
[1]This condition is state-only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

B. SOURCE-WIDE CONDITIONS

Part B outlines the Source-Wide Terms and Conditions that apply to this stationary source. The permittee is subject to these special conditions for the stationary source in addition to the general conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply to this source, NA (not applicable) has been used in the table. If there are no Source-Wide Conditions, this section will be left blank.

C. EMISSION UNIT CONDITIONS

Part C outlines terms and conditions that are specific to individual emission units listed in the Emission Unit Summary Table. The permittee is subject to the special conditions for each emission unit in addition to the General Conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply, NA (not applicable) has been used in the table. If there are no conditions specific to individual emission units, this section will be left blank.

EMISSION UNIT SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EU-SHELLCORE-S2	Seven shell core machines with horizontal exhaust to ambient air. Core wash tank (limited use) with dust collector control exhausted inside the building.	12/02/11	NA
EU-SILOS-S2	Two 75-ton capacity sand storage silos, sand handling equipment, and two sand mixers (sand is mixed with resin) with a fabric filter dust collection system. #1, 8,500 cfm. Includes transfer of sand from trucks to the silo and pneumatic sand feed through enclosed piping from the silo.	12/02/11	NA
EU-LAEMPE#1AND#2-S2	Two Laempe cold box core machines. Phenolic urethane cold box core making process. Mixed sand/resin is set to make cores. The Triethylamine (TEA) catalyst. Emission control is two Dakota acid scrubbers, 3,850 cfm each. Equipment includes two Laempe core making machines and two natural gas fired core ovens, 1.5 MMBtu/hr each; 1.33 tons/hr. nominal throughput capacity.	12/02/11	NA
EU-MISCELLANEOUS-S2	Use of materials ancillary to the core making process including daub/mud, glue/paste, coating, core box release agent, and metal cleaners.	12/02/11	NA

EU-SHELLCORE-S2
EMISSION UNIT CONDITIONS

DESCRIPTION

Seven shell core machines with horizontal exhaust to ambient air. Core wash tank (limited use) with dust collector control exhausted inside building.

Flexible Group ID: NA

POLLUTION CONTROL EQUIPMENT

Horizontal exhaust to ambient air from shell core machines at 9,300 cfm. 2,400 cfm dust collector on the wash tank exhausted inside the building.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOC	1.0 tpy[2]	12-month rolling time period as determined at the end of each calendar month	EU-SHELLCORE-S2	SC VI.1	**R 336.1702(a)**

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate the EU-SHELLCORE-S2 core wash tank unless the dust collector is installed, maintained, and operated in a satisfactory manner. Satisfactory operation includes, but is not limited to, venting the dust collector exhaust inside the building.[2] **(R 336.1301, R 336.1331, R 336.1910)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall calculate the VOC emission rates from EU-SHELLCORE-S2 for each calendar month and 12-month rolling time period using a method acceptable to the AQD District Supervisor. The permittee shall keep all records on file at the facility and make them available to the Department upon request.[2] **(R 336.1702)**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S2

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SVSHELLCORE[A]	24[2]	14[2]	**R 336.2803, R 336.2804, 40 CFR 52.21 (c) & (d)**
[A]Exhaust is vented horizontally to the ambient air			

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-SILOS-S2
EMISSION UNIT CONDITIONS

DESCRIPTION

Two 75-ton capacity sand storage silos, sand handling equipment, and two sand mixers (sand is mixed with resin) with a fabric filter dust collection system. #1, 8500 cfm.

Includes transfer of sand from trucks to the silo and pneumatic sand feed through enclosed piping from the silo.

Flexible Group ID: NA

POLLUTION CONTROL EQUIPMENT

Fabric filter dust collection system #1, 8500 cfm

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. PM	0.10 lb/1,000 lb exhaust gas[2]	Test Protocol*	EU-SILOS-S2	SC VI.5, VI.6	**R 336.1331**
2. PM	2.50 tpy[2]	12-month rolling time period as determined at the end of each calendar month	EU-SILOS-S2	SC VI.4	**R 336.1331**
*Test Protocol shall specify averaging time					

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Sand	25,000 tons/yr throughput[2]	12-month rolling time period as determined at the end of each calendar month	EU-SILOS-S2	SC VI.1	**R 336.1205(3) R 336.1331**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall not operate EU-SILOS-S2 unless a malfunction abatement plan (MAP) as described in Rule 911(2), for the sand storage and handling operations, has been submitted within 90 days of permit issuance, and is implemented and maintained.[2] **(R 336.1331, R 336.1910, R 336.1911, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-SILOS-S2 unless the fabric filter system is installed, maintained, and operated in a satisfactory manner.[2] **(R 336.1205(3), R 336.1301, R 336.1331, R 336.1910)**

2. The permittee shall not operate EU-SILOS-S2 unless a gauge, which continuously measures the pressure drop across the fabric filter dust collection system is installed, maintained and operated in a satisfactory manner.[2] **(R 336.1301, R 336.1331, R 336.1910)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall monitor and record, in a satisfactory manner, the sand usage for EU-SILOS-S2 on a monthly and 12-month rolling time period basis. The permittee shall keep all records on file at the facility and make them available to the Department upon request.[2] **(R 336.1205, R 336.1301, R 336.1331)**

2. The permittee shall monitor and record, in a satisfactory manner, the pressure drop across the EU-SILOS-S2 fabric filter dust collection system on an each operational day basis.[2] **(R 336.1301, R 336.1331, R 336.1910)**

3. The permittee shall keep, in a satisfactory manner, all daily records of the EU-SILOS-S2 fabric filter dust collection system pressure drop, as required by SC VI.2 on file at the facility and make them available to the Department upon request.[2] **(R 336.1301, R 336.1331, R 336.1910)**

4. The permittee shall calculate the PM emission rates from EU-SILOS-S2 for each calendar month and 12-month rolling time period using a method acceptable to the AQD District Supervisor. The permittee shall keep all records on file at the facility and make them available to the Department upon request.[2] **(R 336.1331)**

5. The permittee shall verify the presence of visible emissions by taking six-minute visible emission readings from EU-SILOS-S2 a minimum of once per week. Either a certified or non-certified reader shall take each visible emission reading during routine operating conditions. Multiple stacks may be observed simultaneously. If the permittee observes any visible emissions, the permittee shall immediately implement the following procedures:[2]
   a. The permittee shall perform the six-minute visible emission readings at least once every 30 minutes until emissions are no longer visible or until emissions have been observed for more than two hours.[2]
   b. If visible emissions have been observed for more than two hours, a certified reader shall determine the opacity using Federal Reference Test Method 9 (40 CFR Part 60, Appendix A).[2]
   c. If the results of the Federal Reference Test Method 9 visible emission observation indicate a violation of the opacity standard specified in GC 11, the permittee shall immediately initiate corrective actions.[2]
   (R 336.1301, R 336.1303)

6. The permittee shall keep, in a satisfactory manner, records of all visible emission readings from EU-SILOS-S2. At a minimum, records shall include the date, time, name of observer/reader, whether the reader is certified, and status of visible emissions. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1301, R 336.1303, R 336.1910)**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S2

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1.SVSILOS	18[2]	25[2]	**R 336.2803, R 336.2804, 40 CFR 52.21 (c) & (d)**

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-LAEMPE#1AND#2-S2
EMISSION UNIT CONDITIONS

DESCRIPTION

Two Laempe cold box core machines.

A phenolic urethane cold box core making process. Mixed sand/resin is set to make cores. The TEA catalyst. Emission control is two Dakota acid scrubbers, 3850 cfm each.

Equipment includes two Laempe core making machines and two natural gas fired core ovens, 1.5 MMBtu/hr. each; 1.33 tons/hr. nominal throughput capacity.

Flexible Group ID: NA

POLLUTION CONTROL EQUIPMENT

The TEA catalyst emissions controlled by two Dakota packed tower acid scrubbers, 3850 cfm each

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOC	1.54 tpy[2]	12-month rolling time period as determined at the end of each calendar month	EU-LAEMPE#1AND#2-S2	SC VI.3	**R 336.1702**
2. TEA	1 ppmv (or 99% reduction)[2]	Test Protocol*	EU-LAEMPE#1AND#2-S2	SC V.1	**R 336.1225, 40 CFR 63.7690 (a)(11)(i) or (ii)**
3. Visible Emissions	20% opacity (except for one 6-minute average per hour of not more than 27% opacity)[2]	Test Protocol*	Any building or structure housing EU-LAEMPE#1AND#2-S2	SC V.2	**40 CFR 63.7690 (a)(7)**
*Test Protocol shall specify averaging time					

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Resin Part A	115 tons/yr throughput[2]	12-month rolling time period as determined at the end of each calendar month	EU-LAEMPE#1AND#2-S2	SC VI.1	**R 336.1702**
2. Resin Part B	115 tons/yr throughput[2]	12-month rolling time period as determined at the end of each calendar month	EU-LAEMPE#1AND#2-S2	SC VI.1	**R 336.1702**
3. Catalyst TEA	35 tons/yr throughput[2]	12-month rolling time period as determined at the end of each calendar month	EU-LAEMPE#1AND#2-S2	SC VI.1	**R 336.1702**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall burn only natural gas in the core ovens of EU-LAEMPE#1AND#2-S2.[2] **(R 336.1225, R 336.1702, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d))**

2. The permittee shall submit to the AQD District Supervisor, implement, and maintain an approvable operation and maintenance plan for the EU-LAEMPE#1AND#2-S2 packed tower scrubber system. The plan shall contain all information required by 40 CFR 63.7710(b).[2] **(40 CFR 63.7710(b), 40 CFR 63.7745)**

3. The permittee shall not operate EU-LAEMPE#1AND#2-S2 unless the packed tower scrubber system 3-hour average pH of the scrubber blowdown, as measured by a continuous parameter monitoring system, does not exceed 4.5 OR the pH of the scrubber blowdown, as measured once every 8 hours during process operations, does not exceed 4.5.[2] **(R 336.1225, R 336.1702, R 336.1901, R 336.1910, 40 CFR 63.7690(b)(5))**

4. The permittee shall not operate EU-LAEMPE#1AND#2-S2 unless the packed tower scrubber system 3-hour average scrubbing liquid flow rate is maintained at or above the minimum level established during the initial or subsequent performance test.[2] **(R 336.1225, R 336.1702, R 336.1901, R 336.1910, 40 CFR 63.7690(b)(5))**

5. The permittee shall operate and maintain the air pollution control and monitoring equipment in a manner consistent with good air pollution control practices for minimizing emissions.[2] **(40 CFR 63.6(e)(1)(1), 40 CFR 63.7710(a))**

6. The permittee shall comply with the applicable emission limitations, work practice standards, and operation and maintenance requirements in 40 CFR Part 63, Subpart EEEEE at all times, except during periods of startup, shutdown, or malfunction.[2] **(40 CFR 63.7720(a))**

7. The permittee shall develop and implement a written startup, shutdown, and malfunction plan in accordance with 40 CFR 63.6(e)(3).[2] **(40 CFR 63.7720(c))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-LAEMPE#1AND#2-S2 unless the packed tower scrubber system is installed, maintained, and operated in a satisfactory manner. Satisfactory operation includes, but is not limited to, installing and maintaining the scrubber according to the provisions outlined in 40 CFR 63.7690(b) and 40 CFR 63.7710.[2] **(R 336.1225, 40 CFR 63.7690(b), 40 CFR 63.7710)**

2. The permittee shall install, calibrate, maintain and operate in a satisfactory manner, a continuous parameter monitoring system for the EU-LAEMPE#1AND#2-S2 packed tower scrubber system according to the provisions outlined in 40 CFR 63.7690(b) and 40 CFR 63.7741.[2] **(R 336.1225, R 336.1702, R 336.1910, 40 CFR 63.7690(b), 40 CFR 63.7740, 40 CFR 63.7741)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. No less frequently than every 5 years and each time the permittee elects to change an operating limit or to comply with a different alternative emissions limit, the permittee shall demonstrate compliance with the TEA emission limitations from EU-LAEMPE#1AND#2-S2 by subsequent testing at owner's expense, in accordance with 40 CFR Part 63, Subparts A and EEEEE. No less than 60 days prior to testing, the permittee shall submit a complete test plan to the AQD Technical Programs Unit and District Office. The AQD must approve the final plan prior to testing. Verification of compliance with the emission limitations includes the submittal of a complete report of the test results to the AQD Technical Programs Unit and District Office within 60 days following the last date of the test.[2] **(40 CFR 63.7731(a), 40 CFR 63.7743)**

2. No less frequently than once every 6 months, the permittee shall demonstrate compliance with the opacity limitation from EU-LAEMPE#1AND#2-S2 by subsequent testing at owner's expense, in accordance with 40 CFR Part 63, Subparts A and EEEEE. No less than 60 days prior to testing, the permittee shall submit a

notification of intent to perform a compliance test to the AQD Technical Programs Unit and District Office. Verification of compliance with the limitation includes the submittal of a complete report of the test results to the AQD Technical Programs Unit and District Office within 60 days following the last date of the test.[2] **(40 CFR 63.7731(b), 40 CFR 63.7743)**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall monitor and record, in a satisfactory manner, the resin and catalyst usage for EU-LAEMPE#1AND#2-S2 on a monthly and 12-month rolling time period basis.[2] **(R 336.1225, R 336.1702)**

2. The permittee shall monitor and record the EU-LAEMPE#1AND#2-S2 packed tower scrubber system scrubbing liquid flow rate and pH of the scrubber blowdown using the continuous parameter monitoring system in accordance with the requirements outlined in 40 CFR 63.7740, 40 CFR 63.7741, 40 CFR 63.7742, and 40 CFR 63.7743.[2] **(R 336.1225, R 336.1702, R 336.1910, 40 CFR 63.7740, 40 CFR 63.7741, 40 CFR 63.7742, 40 CFR 63.7743)**

3. The permittee shall calculate the VOC emission rates from EU-LAEMPE#1AND#2-S2 for each 12 month rolling time period using a method acceptable to the AQD District Supervisor.[2] **(R 336.1702)**

4. The permittee shall keep, in a satisfactory manner, records to demonstrate continuous compliance with the applicable operation and maintenance requirements of 40 CFR Part 63, Subpart EEEEE. All records shall be kept on file and made available to the Department upon request.[2] **(40 CFR 63.7745, 40 CFR 63.7753)**

5. The permittee shall keep, in a satisfactory manner, all records required by 40 CFR 63.7752 to demonstrate compliance with 40 CFR Part 63, Subpart EEEEE. All records shall be kept on file and made available to the Department upon request.[2] **(40 CFR 63.7752, 40 CFR 63.7753)**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. The permittee shall submit all applicable notifications required in 40 CFR 63.8(e), 40 CFR 63.8(f)(4) and (6) for EU-LAEMPE#1AND#2-S2.[2] **(40 CFR 63.6, 40 CFR 63.7, 40 CFR 63.8, 40 CFR 63.9, 40 CFR 63.7750)**

5. The permittee shall submit semiannual compliance reports. The permittee shall submit all records to the AQD District Supervisor in an acceptable format, in accordance with 40 CFR 63.7751.[2] **(40 CFR 63.7746, 40 CFR 63.7751)**

See Appendix 8-S2

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SVLAEMPE#1	20[2]	52[2]	**R 336.1225, R 336.2803, R 336.2804, 40 CFR 52.21 (c) & (d)**
2. SVLAEMPE#2	20[2]	51[2]	**R 336.1225, R 336.2803, R 336.2804, 40 CFR 52.21 (c) & (d)**
3. SVLaempeOven1	26[2]	52[2]	**R 336.1225, R 336.2803, R 336.2804, 40 CFR 52.21 (c) & (d)**
4. SVLaempeOven2	11[2]	53[2]	**R 336.1225, R 336.2803, R 336.2804, 40 CFR 52.21 (c) & (d)**

IX. OTHER REQUIREMENT(S)

1. Within 30 days after the compliance date specified in 40 CFR 63.7683, the permittee shall demonstrate initial compliance with the applicable work practice standards outlined in 40 CFR 63.7700 and operation and maintenance requirements outlined in 40 CFR 63.7710.[2] **(40 CFR 63.7730(b), 40 CFR 63.7734, 40 CFR 63.7735, 40 CFR 63.7736)**

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-MISCELLANEOUS-S2
EMISSION UNIT CONDITIONS

DESCRIPTION

Use of materials ancillary to the core making process including daub/mud, glue/paste, coating, core box release agent, and metal cleaners

Flexible Group ID: NA

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOC	7.0 tpy[2]	12-month rolling time period as determined at the end of each calendar month	EU-MISCELLANEOUS-S2	SC VI.1, VI.2, VI.3	**R 336.1702**

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall handle all VOC and/or HAP containing materials, including coatings, reducers, solvents and thinners, in a manner to minimize the generation of fugitive emissions. The permittee shall keep containers covered at all times except when operator access is necessary.[2] **(R 336.1205(3), R 336.1224, R 336.1225, R 336.1702(a))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall monitor and record, in a satisfactory manner, the VOC content of each material included in EU-MISCELLANEOUS-S2. A Material Safety Data Sheet or other manufacturer's certification acceptable to the District Supervisor is a satisfactory record.[2] **(R 336.1205(3), R 336.1225, R 336.1702(a))**

2. The permittee shall monitor and record, in a satisfactory manner, the usage rate in gallons on a monthly and 12-month rolling time period basis of each material included in EU-MISCELLANEOUS-S2.[2] **(R 336.1205, R 336.1225, R 336.1702)**

3. The permittee shall calculate and keep records of the VOC emission rate from EU-MISCELLANEOUS-S2 for each 12-month rolling time period using a method acceptable to the AQD District Supervisor.[2] **(R 336.1205, R 336.1225, R 336.1702)**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S2

VIII. STACK/VENT RESTRICTION(S)

NA

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1]This condition is state-only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

D. FLEXIBLE GROUP CONDITIONS

Part D outlines the terms and conditions that apply to more than one emission unit. The permittee is subject to the special conditions for each flexible group in addition to the General Conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply, NA (not applicable) has been used in the table. If there are no special conditions that apply to more than one emission unit, this section will be left blank.

E. NON-APPLICABLE REQUIREMENTS

At the time of the ROP issuance, the AQD has determined that no non-applicable requirements have been identified for incorporation into the permit shield provision set forth in the General Conditions in Part A pursuant to Rule 213(6)(a)(ii).

APPENDICES

Appendix 1-S2. Abbreviations and Acronyms

The following is an alphabetical listing of abbreviations/acronyms that may be used in this permit.

AQD	Air Quality Division	MM	Million
acfm	Actual cubic feet per minute	MSDS	Material Safety Data Sheet
BACT	Best Available Control Technology	MW	Megawatts
BTU	British Thermal Unit	NA	Not Applicable
°C	Degrees Celsius	NAAQS	National Ambient Air Quality Standards
CAA	Federal Clean Air Act	NESHAP	National Emission Standard for Hazardous Air Pollutants
CAM	Compliance Assurance Monitoring	NMOC	Non-methane Organic Compounds
CEM	Continuous Emission Monitoring	NOx	Oxides of Nitrogen
CFR	Code of Federal Regulations	NSPS	New Source Performance Standards
CO	Carbon Monoxide	NSR	New Source Review
COM	Continuous Opacity Monitoring	PM	Particulate Matter
department	Michigan Department of Environmental Quality	PM-10	Particulate Matter less than 10 microns in diameter
dscf	Dry standard cubic foot	pph	Pound per hour
dscm	Dry standard cubic meter	ppm	Parts per million
EPA	United States Environmental Protection Agency	ppmv	Parts per million by volume
EU	Emission Unit	ppmw	Parts per million by weight
°F	Degrees Fahrenheit	PS	Performance Specification
FG	Flexible Group	PSD	Prevention of Significant Deterioration
GACS	Gallon of Applied Coating Solids	psia	Pounds per square inch absolute
GC	General Condition	psig	Pounds per square inch gauge
gr	Grains	PeTE	Permanent Total Enclosure
HAP	Hazardous Air Pollutant	PTI	Permit to Install
Hg	Mercury	RACT	Reasonable Available Control Technology
hr	Hour	ROP	Renewable Operating Permit
HP	Horsepower	SC	Special Condition
H_2S	Hydrogen Sulfide	scf	Standard cubic feet
HVLP	High Volume Low Pressure *	sec	Seconds
ID	Identification (Number)	SCR	Selective Catalytic Reduction
IRSL	Initial Risk Screening Level	SO_2	Sulfur Dioxide
ITSL	Initial Threshold Screening Level	SRN	State Registration Number
LAER	Lowest Achievable Emission Rate	TAC	Toxic Air Contaminant
lb	Pound	Temp	Temperature
m	Meter	THC	Total Hydrocarbons
MACT	Maximum Achievable Control Technology	tpy	Tons per year
MAERS	Michigan Air Emissions Reporting System	µg	Microgram
MAP	Malfunction Abatement Plan	VE	Visible Emissions
MDEQ	Michigan Department of Environmental Quality	VOC	Volatile Organic Compounds
mg	Milligram	yr	Year
mm	Millimeter		

*For HVLP applicators, the pressure measured at the gun air cap shall not exceed 10 pounds per square inch gauge (psig).

Appendix 2-S2. Schedule of Compliance

The permittee certified in the ROP application that this stationary source is in compliance with all applicable requirements and the permittee shall continue to comply with all terms and conditions of this ROP. A Schedule of Compliance is not required. **(R 336.1213(4)(a), R 336.1119(a)(ii))**

Appendix 3-S2. Monitoring Requirements

Specific monitoring requirement procedures, methods or specifications are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 4-S2. Recordkeeping

Specific recordkeeping requirement formats and procedures are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 5-S2. Testing Procedures

Specific testing requirement plans, procedures, and averaging times are detailed in the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 6-S2. Permits to Install

The following table lists any PTI and/or Permit to Operate (PTO) that relate to the identified emission units or flexible groups as of the effective date of this ROP. This includes all PTIs and/or PTOs that are hereby incorporated into Source-Wide PTI No. MI-PTI-N5814-2015. The PTIs issued after the effective date of this ROP, including amendments or modifications, will be identified in Appendix 6 upon renewal.

Permit to Install Number	Description of Equipment	Corresponding Emission Unit(s) or Flexible Group(s)
162-11A	Incorporate several changes to existing PTI No. 162-11, including administrative changes, removal of equipment, and incorporation of conditions related to 40 CFR, Part 63, Subparts A and EEEEE.	EU-SHELLCORE-S2, EU-SILOS-S2, EU-LAEMPE#1AND#2-S2, EU-MISCELLANEOUS-S2

Appendix 7-S2. Emission Calculations

Specific emission calculations to be used with monitoring, testing or recordkeeping data are detailed in the appropriate Source-Wide, Emission Unit and/or Flexible group Special Conditions. Therefore, this appendix is not applicable.

Appendix 8-S2. Reporting

A. Annual, Semiannual, and Deviation Certification Reporting

The permittee shall use the MDEQ, AQD, Report Certification form (EQP 5736) and MDEQ, AQD, Deviation Report form (EQP 5737) for the annual, semiannual and deviation certification reporting referenced in the Reporting Section of the Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Alternative formats must meet the provisions of Rule 213(4)(c) and Rule 213(3)(c)(i), respectively, and be approved by the AQD District Supervisor.

B. Other Reporting

Specific reporting requirement formats and procedures are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, Part B of this appendix is not applicable.

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

EFFECTIVE DATE: July 8, 2015

ISSUED TO

BREMBO NORTH AMERICA, INC.

State Registration Number (SRN): N6226

LOCATED AT

29991 M-60 East, Homer, Michigan 49245

RENEWABLE OPERATING PERMIT

Permit Number: MI-ROP-N6226-2015

Expiration Date: July 8, 2020

Administratively Complete ROP Renewal Application Due Between
January 8, 2019 and January 8, 2020

This Renewable Operating Permit (ROP) is issued in accordance with and subject to Section 5506(3) of Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451). Pursuant to Michigan Air Pollution Control Rule 210(1), this ROP constitutes the permittee's authority to operate the stationary source identified above in accordance with the general conditions, special conditions and attachments contained herein. Operation of the stationary source and all emission units listed in the permit are subject to all applicable future or amended rules and regulations pursuant to Act 451 and the federal Clean Air Act.

SOURCE-WIDE PERMIT TO INSTALL

Permit Number: MI-PTI-N6226-2015

This Permit to Install (PTI) is issued in accordance with and subject to Section 5505(5) of Act 451. Pursuant to Michigan Air Pollution Control Rule 214a, the terms and conditions herein, identified by the underlying applicable requirement citation of Rule 201(1)(a), constitute a federally enforceable PTI. The PTI terms and conditions do not expire and remain in effect unless the criteria of Rule 201(6) are met. Operation of all emission units identified in the PTI is subject to all applicable future or amended rules and regulations pursuant to Act 451 and the federal Clean Air Act.

Michigan Department of Environmental Quality

Mary A. Douglas, Kalamazoo District Supervisor

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AUTHORITY AND ENFORCEABILITY

For the purpose of this permit, the **permittee** is defined as any person who owns or operates an emission unit at a stationary source for which this permit has been issued. The **department** is defined in Rule 104(d) as the Director of the Michigan Department of Environmental Quality (MDEQ) or his or her designee.

The permittee shall comply with all specific details in the permit terms and conditions and the cited underlying applicable requirements. All terms and conditions in this ROP are both federally enforceable and state enforceable unless otherwise footnoted. Certain terms and conditions are applicable to most stationary sources for which an ROP has been issued. These general conditions are included in Part A of this ROP. Other terms and conditions may apply to a specific emission unit, several emission units which are represented as a flexible group, or the entire stationary source which is represented as a Source-Wide group. Special conditions are identified in Parts B, C, D and/or the appendices.

In accordance with Rule 213(2)(a), all underlying applicable requirements are identified for each ROP term or condition. All terms and conditions that are included in a PTI, are streamlined, subsumed and/or are state-only enforceable will be noted as such.

In accordance with Section 5507 of Act 451, the permittee has included in the ROP application a compliance certification, a schedule of compliance, and a compliance plan. For applicable requirements with which the source is in compliance, the source will continue to comply with these requirements. For applicable requirements with which the source is not in compliance, the source will comply with the detailed schedule of compliance requirements that are incorporated as an appendix in this ROP. Furthermore, for any applicable requirements effective after the date of issuance of this ROP, the stationary source will meet the requirements on a timely basis, unless the underlying applicable requirement requires a more detailed schedule of compliance.

Issuance of this permit does not obviate the necessity of obtaining such permits or approvals from other units of government as required by law.

A. GENERAL CONDITIONS

Permit Enforceability

- All conditions in this permit are both federally enforceable and state enforceable unless otherwise noted. **(R 336.1213(5))**

- Those conditions that are hereby incorporated in a state-only enforceable Source-Wide PTI pursuant to Rule 201(2)(d) are designated by footnote one. **(R 336.1213(5)(a), R 336.1214a(5))**

- Those conditions that are hereby incorporated in a federally enforceable Source-Wide PTI pursuant to Rule 201(2)(c) are designated by footnote two. **(R 336.1213(5)(b), R 336.1214a(3))**

General Provisions

1. The permittee shall comply with all conditions of this ROP. Any ROP noncompliance constitutes a violation of Act 451, and is grounds for enforcement action, for ROP revocation or revision, or for denial of the renewal of the ROP. All terms and conditions of this ROP that are designated as federally enforceable are enforceable by the Administrator of the United States Environmental Protection Agency (USEPA) and by citizens under the provisions of the federal Clean Air Act (CAA). Any terms and conditions based on applicable requirements which are designated as "state-only" are not enforceable by the USEPA or citizens pursuant to the CAA. **(R 336.1213(1)(a))**

2. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this ROP. **(R 336.1213(1)(b))**

3. This ROP may be modified, revised, or revoked for cause. The filing of a request by the permittee for a permit modification, revision, or termination, or a notification of planned changes or anticipated noncompliance does not stay any ROP term or condition. This does not supersede or affect the ability of the permittee to make changes, at the permittee's own risk, pursuant to Rule 215 and Rule 216. **(R 336.1213(1)(c))**

4. The permittee shall allow the department, or an authorized representative of the department, upon presentation of credentials and other documents as may be required by law and upon stating the authority for and purpose of the investigation, to perform any of the following activities **(R 336.1213(1)(d))**:
   a. Enter, at reasonable times, a stationary source or other premises where emissions-related activity is conducted or where records must be kept under the conditions of the ROP.
   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the ROP.
   c. Inspect, at reasonable times, any of the following:
      i. Any stationary source.
      ii. Any emission unit.
      iii. Any equipment, including monitoring and air pollution control equipment.
      iv. Any work practices or operations regulated or required under the ROP.
   d. As authorized by Section 5526 of Act 451, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the ROP or applicable requirements.

5. The permittee shall furnish to the department, within a reasonable time, any information the department may request, in writing, to determine whether cause exists for modifying, revising, or revoking the ROP or to determine compliance with this ROP. Upon request, the permittee shall also furnish to the department copies of any records that are required to be kept as a term or condition of this ROP. For information which is claimed by the permittee to be confidential, consistent with the requirements of the 1976 PA 442, MCL §15.231 et seq., and known as the Freedom of Information Act, the person may also be required to furnish the records directly to the USEPA together with a claim of confidentiality. **(R 336.1213(1)(e))**

6. A challenge by any person, the Administrator of the USEPA, or the department to a particular condition or a part of this ROP shall not set aside, delay, stay, or in any way affect the applicability or enforceability of any other condition or part of this ROP. **(R 336.1213(1)(f))**

7. The permittee shall pay fees consistent with the fee schedule and requirements pursuant to Section 5522 of Act 451. **(R 336.1213(1)(g))**

8. This ROP does not convey any property rights or any exclusive privilege. **(R 336.1213(1)(h))**

Equipment & Design

9. Any collected air contaminants shall be removed as necessary to maintain the equipment at the required operating efficiency. The collection and disposal of air contaminants shall be performed in a manner so as to minimize the introduction of contaminants to the outer air. Transport of collected air contaminants in Priority I and II areas requires the use of material handling methods specified in Rule 370(2).[2] **(R 336.1370)**

10. Any air cleaning device shall be installed, maintained, and operated in a satisfactory manner and in accordance with the Michigan Air Pollution Control rules and existing law. **(R 336.1910)**

Emission Limits

11. Unless otherwise specified in this ROP, the permittee shall comply with Rule 301, which states, in part, "Except as provided in subrules 2, 3, and 4 of this rule, a person shall not cause or permit to be discharged into the outer air from a process or process equipment a visible emission of a density greater than the most stringent of the following":[2] **(R 336.1301(1))**:
    a. A 6-minute average of 20 percent opacity, except for one 6-minute average per hour of not more than 27 percent opacity.
    b. A limit specified by an applicable federal new source performance standard.

    The grading of visible emissions shall be determined in accordance with Rule 303.

12. The permittee shall not cause or permit the emission of an air contaminant or water vapor in quantities that cause, alone or in reaction with other air contaminants, either of the following:
    a. Injurious effects to human health or safety, animal life, plant life of significant economic value, or property.[1] **(R 336.1901(a))**
    b. Unreasonable interference with the comfortable enjoyment of life and property.[1] **(R 336.1901(b))**

Testing/Sampling

13. The department may require the owner or operator of any source of an air contaminant to conduct acceptable performance tests, at the owner's or operator's expense, in accordance with Rule 1001 and Rule 1003, under any of the conditions listed in Rule 1001(1).[2] **(R 336.2001)**

14. Any required performance testing shall be conducted in accordance with Rule 1001(2), Rule 1001(3) and Rule 1003. **(R 336.2001(2), R 336.2001(3), R 336.2003(1))**

15. Any required test results shall be submitted to the Air Quality Division (AQD) in the format prescribed by the applicable reference test method within 60 days following the last date of the test. **(R 336.2001(5))**

Monitoring/Recordkeeping

16. Records of any periodic emission or parametric monitoring required in this ROP shall include the following information specified in Rule 213(3)(b)(i), where appropriate **(R 336.1213(3)(b))**:
    a. The date, location, time, and method of sampling or measurements.
    b. The dates the analyses of the samples were performed.
    c. The company or entity that performed the analyses of the samples.

d. The analytical techniques or methods used.
e. The results of the analyses.
f. The related process operating conditions or parameters that existed at the time of sampling or measurement.

17. All required monitoring data, support information and all reports, including reports of all instances of deviation from permit requirements, shall be kept and furnished to the department upon request for a period of not less than 5 years from the date of the monitoring sample, measurement, report or application. Support information includes all calibration and maintenance records and all original strip-chart recordings, or other original data records, for continuous monitoring instrumentation and copies of all reports required by the ROP. **(R 336.1213(1)(e), R 336.1213(3)(b)(ii))**

Certification & Reporting

18. Except for the alternate certification schedule provided in Rule 213(3)(c)(iii)(B), any document required to be submitted to the department as a term or condition of this ROP shall contain an original certification by a Responsible Official which states that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete. **(R 336.1213(3)(c))**

19. A Responsible Official shall certify to the appropriate AQD District Office and to the USEPA that the stationary source is and has been in compliance with all terms and conditions contained in the ROP except for deviations that have been or are being reported to the appropriate AQD District Office pursuant to Rule 213(3)(c). This certification shall include all the information specified in Rule 213(4)(c)(i) through (v) and shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the certification are true, accurate, and complete. The USEPA address is: USEPA, Air Compliance Data - Michigan, Air and Radiation Division, 77 West Jackson Boulevard, Chicago, Illinois 60604. **(R 336.1213(4)(c))**

20. The certification of compliance shall be submitted annually for the term of this ROP as detailed in the special conditions, or more frequently if specified in an applicable requirement or in this ROP. **(R 336.1213(4)(c))**

21. The permittee shall promptly report any deviations from ROP requirements and certify the reports. The prompt reporting of deviations from ROP requirements is defined in Rule 213(3)(c)(ii) as follows, unless otherwise described in this ROP **(R 336.1213(3)(c))**:
    a. For deviations that exceed the emissions allowed under the ROP, prompt reporting means reporting consistent with the requirements of Rule 912 as detailed in Condition 25. All reports submitted pursuant to this paragraph shall be promptly certified as specified in Rule 213(3)(c)(iii).
    b. For deviations which exceed the emissions allowed under the ROP and which are not reported pursuant to Rule 912 due to the duration of the deviation, prompt reporting means the reporting of all deviations in the semiannual reports required by Rule 213(3)(c)(i). The report shall describe reasons for each deviation and the actions taken to minimize or correct each deviation.
    c. For deviations that do not exceed the emissions allowed under the ROP, prompt reporting means the reporting of all deviations in the semiannual reports required by Rule 213(3)(c)(i). The report shall describe the reasons for each deviation and the actions taken to minimize or correct each deviation.

22. For reports required pursuant to Rule 213(3)(c)(ii), prompt certification of the reports is described in Rule 213(3)(c)(iii) as either of the following **(R 336.1213(3)(c))**:
    a. Submitting a certification by a Responsible Official with each report which states that, based on information and belief formed after reasonable inquiry, the statements and information in the report are true, accurate, and complete.
    b. Submitting, within 30 days following the end of a calendar month during which one or more prompt reports of deviations from the emissions allowed under the ROP were submitted to the department pursuant to Rule 213(3)(c)(ii), a certification by a Responsible Official which states that, “based on information and belief formed after reasonable inquiry, the statements and information contained in each of the reports submitted during the previous month were true, accurate, and complete”. The certification shall include a listing of the reports that are being certified. Any report submitted pursuant to Rule 213(3)(c)(ii) that will be certified on a monthly basis pursuant to this paragraph shall include a statement that certification of the report will be provided within 30 days following the end of the calendar month.

23. Semiannually for the term of the ROP as detailed in the special conditions, or more frequently if specified, the permittee shall submit certified reports of any required monitoring to the appropriate AQD District Office. All instances of deviations from ROP requirements during the reporting period shall be clearly identified in the reports. **(R 336.1213(3)(c)(i))**

24. On an annual basis, the permittee shall report the actual emissions, or the information necessary to determine the actual emissions, of each regulated air pollutant as defined in Rule 212(6) for each emission unit utilizing the emissions inventory forms provided by the department. **(R 336.1212(6))**

25. The permittee shall provide notice of an abnormal condition, start-up, shutdown, or malfunction that results in emissions of a hazardous or toxic air pollutant which continue for more than one hour in excess of any applicable standard or limitation, or emissions of any air contaminant continuing for more than two hours in excess of an applicable standard or limitation, as required in Rule 912, to the appropriate AQD District Office. The notice shall be provided not later than two business days after the start-up, shutdown, or discovery of the abnormal conditions or malfunction. Notice shall be by any reasonable means, including electronic, telephonic, or oral communication. Written reports, if required under Rule 912, must be submitted to the appropriate AQD District Supervisor within 10 days after the start-up or shutdown occurred, within 10 days after the abnormal conditions or malfunction has been corrected, or within 30 days of discovery of the abnormal conditions or malfunction, whichever is first. The written reports shall include all of the information required in Rule 912(5) and shall be certified by a Responsible Official in a manner consistent with the CAA.[2] **(R 336.1912)**

Permit Shield

26. Compliance with the conditions of the ROP shall be considered compliance with any applicable requirements as of the date of ROP issuance, if either of the following provisions is satisfied **(R 336.1213(6)(a)(i), R 336.1213(6)(a)(ii))**:
    a. The applicable requirements are included and are specifically identified in the ROP.
    b. The permit includes a determination or concise summary of the determination by the department that other specifically identified requirements are not applicable to the stationary source.

    Any requirements identified in Part E of this ROP have been identified as non-applicable to this ROP and are included in the permit shield.

27. Nothing in this ROP shall alter or affect any of the following:
    a. The provisions of Section 303 of the CAA, emergency orders, including the authority of the USEPA under Section 303 of the CAA. **(R 336.1213(6)(b)(i))**
    b. The liability of the owner or operator of this source for any violation of applicable requirements prior to or at the time of this ROP issuance. **(R 336.1213(6)(b)(ii))**
    c. The applicable requirements of the acid rain program, consistent with Section 408(a) of the CAA. **(R 336.1213(6)(b)(iii))**
    d. The ability of the USEPA to obtain information from a source pursuant to Section 114 of the CAA. **(R 336.1213(6)(b)(iv))**

28. The permit shield shall not apply to provisions incorporated into this ROP through procedures for any of the following:
    a. Operational flexibility changes made pursuant to Rule 215. **(R 336.1215(5))**
    b. Administrative Amendments made pursuant to Rule 216(1)(a)(i)-(iv). **(R 336.1216(1)(b)(iii))**
    c. Administrative Amendments made pursuant to Rule 216(1)(a)(v) until the amendment has been approved by the department. **(R 336.1216(1)(c)(iii))**
    d. Minor Permit Modifications made pursuant to Rule 216(2). **(R 336.1216(2)(f))**
    e. State-Only Modifications made pursuant to Rule 216(4) until the changes have been approved by the department. **(R 336.1216(4)(e))**

29. Expiration of this ROP results in the loss of the permit shield. If a timely and administratively complete application for renewal is submitted not more than 18 months, but not less than 6 months, before the expiration date of the ROP, but the department fails to take final action before the end of the ROP term, the existing ROP

does not expire until the renewal is issued or denied, and the permit shield shall extend beyond the original ROP term until the department takes final action. **(R 336.1217(1)(c), R 336.1217(1)(a))**

Revisions

30. For changes to any process or process equipment covered by this ROP that do not require a revision of the ROP pursuant to Rule 216, the permittee must comply with Rule 215. **(R 336.1215, R 336.1216)**

31. A change in ownership or operational control of a stationary source covered by this ROP shall be made pursuant to Rule 216(1). **(R 336.1219(2))**

32. For revisions to this ROP, an administratively complete application shall be considered timely if it is received by the department in accordance with the time frames specified in Rule 216. **(R 336.1210(10))**

33. Pursuant to Rule 216(1)(b)(iii), Rule 216(2)(d) and Rule 216(4)(d), after a change has been made, and until the department takes final action, the permittee shall comply with both the applicable requirements governing the change and the ROP terms and conditions proposed in the application for the modification. During this time period, the permittee may choose to not comply with the existing ROP terms and conditions that the application seeks to change. However, if the permittee fails to comply with the ROP terms and conditions proposed in the application during this time period, the terms and conditions in the ROP are enforceable. **(R 336.1216(1)(c)(iii), R 336.1216(2)(d), R 336.1216(4)(d))**

Reopenings

34. A ROP shall be reopened by the department prior to the expiration date and revised by the department under any of the following circumstances:
    a. If additional requirements become applicable to this stationary source with three or more years remaining in the term of the ROP, but not if the effective date of the new applicable requirement is later than the ROP expiration date. **(R 336.1217(2)(a)(i))**
    b. If additional requirements pursuant to Title IV of the CAA become applicable to this stationary source. **(R 336.1217(2)(a)(ii))**
    c. If the department determines that the ROP contains a material mistake, information required by any applicable requirement was omitted, or inaccurate statements were made in establishing emission limits or the terms or conditions of the ROP. **(R 336.1217(2)(a)(iii))**
    d. If the department determines that the ROP must be revised to ensure compliance with the applicable requirements. **(R 336.1217(2)(a)(iv))**

Renewals

35. For renewal of this ROP, an administratively complete application shall be considered timely if it is received by the department not more than 18 months, but not less than 6 months, before the expiration date of the ROP. **(R 336.1210(8))**

Stratospheric Ozone Protection

36. If the permittee is subject to Title 40 of the CFR Part 82 and services, maintains, or repairs appliances except for motor vehicle air conditioners (MVAC), or disposes of appliances containing refrigerant, including MVAC and small appliances, or if the permittee is a refrigerant reclaimer, appliance owner or a manufacturer of appliances or recycling and recovery equipment, the permittee shall comply with all applicable standards for recycling and emissions reduction pursuant to 40 CFR Part 82Subpart F.

37. If the permittee is subject to 40 CFR Part 82, and performs a service on motor (fleet) vehicles when this service involves refrigerant in the MVAC, the permittee is subject to all the applicable requirements as specified in 40 CFR Part 82, Subpart B, Servicing of Motor Vehicle Air Conditioners. The term “motor vehicle” as used in Subpart B does not include a vehicle in which final assembly of the vehicle has not been completed by the original equipment manufacturer. The term MVAC as used in Subpart B does not include the air-tight sealed

refrigeration system used for refrigerated cargo or an air conditioning system on passenger buses using Hydrochlorofluorocarbon-22 refrigerant.

Risk Management Plan

38. If subject to Section 112(r) of the CAA and 40 CFR Part 68, the permittee shall register and submit to the USEPA the required data related to the risk management plan for reducing the probability of accidental releases of any regulated substances listed pursuant to Section 112(r)(3) of the CAA as amended in 40 CFR Part 68.130. The list of substances, threshold quantities, and accident prevention regulations promulgated under 40 CFR Part 68, do not limit in any way the general duty provisions under Section 112(r)(1).

39. If subject to Section 112(r) of the CAA and 40 CFR Part 68, the permittee shall comply with the requirements of 40 CFR Part 68, no later than the latest of the following dates as provided in 40 CFR 68.10(a):
    a. June 21, 1999,
    b. Three years after the date on which a regulated substance is first listed under 40 CFR 68.130, or
    c. The date on which a regulated substance is first present above a threshold quantity in a process.

40. If subject to Section 112(r) of the CAA and 40 CFR Part 68, the permittee shall submit any additional relevant information requested by any regulatory agency necessary to ensure compliance with the requirements of 40 CFR Part 68.

41. If subject to Section 112(r) of the CAA and 40 CFR Part 68, the permittee shall annually certify compliance with all applicable requirements of Section 112(r) as detailed in Rule 213(4)(c)). **(40 CFR Part 68)**

Emission Trading

42. Emission averaging and emission reduction credit trading are allowed pursuant to any applicable interstate or regional emission trading program that has been approved by the Administrator of the USEPA as a part of Michigan's State Implementation Plan. Such activities must comply with Rule 215 and Rule 216. **(R 336.1213(12))**

Permit To Install (PTI)

43. The process or process equipment included in this permit shall not be reconstructed, relocated, or modified unless a PTI authorizing such action is issued by the department, except to the extent such action is exempt from the PTI requirements by any applicable rule.[2] **(R 336.1201(1))**

44. The department may, after notice and opportunity for a hearing, revoke PTI terms or conditions if evidence indicates the process or process equipment is not performing in accordance with the terms and conditions of the PTI or is violating the department's rules or the CAA.[2] **(R 336.1201(8) Section 5510 of Act 451))**

45. The terms and conditions of a PTI shall apply to any person or legal entity that now or hereafter owns or operates the process or process equipment at the location authorized by the PTI. If a new owner or operator submits a written request to the department pursuant to Rule 219 and the department approves the request, this PTI will be amended to reflect the change of ownership or operational control. The request must include all of the information required by Subrules (1)(a), (b) and (c) of Rule 219. The written request shall be sent to the appropriate AQD District Supervisor, MDEQ.[2] **(R 336.1219)**

46. If the installation, reconstruction, relocation, or modification of the equipment for which PTI terms and conditions have been approved has not commenced within 18 months of the original PTI issuance date, or has been interrupted for 18 months, the applicable terms and conditions from that PTI, as incorporated into the ROP, shall become void unless otherwise authorized by the department. Furthermore, the person to whom that PTI was issued, or the designated authorized agent, shall notify the department via the Supervisor, Permit Section, MDEQ, AQD, P.O. Box 30260, Lansing, Michigan 48909, if it is decided not to pursue the installation, reconstruction, relocation, or modification of the equipment allowed by the terms and conditions from that PTI.[2] **(R 336.1201(4))**

Footnotes:

[1]This condition is state-only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

B. SOURCE-WIDE CONDITIONS

Part B outlines the Source-Wide Terms and Conditions that apply to this stationary source. The permittee is subject to these special conditions for the stationary source in addition to the general conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply to this source, NA (not applicable) has been used in the table. If there are no Source-Wide Conditions, this section will be left blank.

C. EMISSION UNIT CONDITIONS

Part C outlines terms and conditions that are specific to individual emission units listed in the Emission Unit Summary Table. The permittee is subject to the special conditions for each emission unit in addition to the General Conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply, NA (not applicable) has been used in the table. If there are no conditions specific to individual emission units, this section will be left blank.

EMISSION UNIT SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EU-GeoMet-01	The HVLP spray guns apply the coating to multiple surfaces of automotive brake products. One paint booth applies paint product to the surfaces. Brake rotors or drums are heated using an oven after the coating has been applied. Associated flash-off areas/drying area allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	09-01-09	FG-GeoMet FG-MISCMETAL FG-MACT MMMM
EU-GeoMet-02	The HVLP spray guns apply the coating to multiple surfaces of automotive brake products. One paint booth applies paint product to the surfaces. Brake rotors or drums are heated using an oven after the coating has been applied. Associated flash-off areas/drying area allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	11-01-11	FG-GeoMet FG-MISCMETAL FG-MACT MMMM
EU-Black (Sprimag Black)	Brake rotors or drums are pre-heated using a single induction unit and HVLP spray guns apply the coating to multiple surfaces of automotive brake products. Coating line applies coating to several surfaces on brake rotors and brake drums. A paint booth applies paint product to the surfaces and associated flash-off area/drying area that allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	09-01-01	FG-Magni&Black FG-MACT MMMM

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EU-Zinc-01	Brake rotors or drums are pre-heated using a single induction unit and HVLP spray guns apply the coating to multiple surfaces of automotive brake products. The coating line applies coating to several surfaces on brake rotors and brake drums. A paint booth applies paint product to the surfaces and associated flash-off area/drying area that allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	02-01-01	FG-Zinc FG-MACT MMMM
EU-Zinc-02 (Sprimag Zinc)	The HVLP spray guns apply the coating to multiple surfaces of automotive brake products. A paint booth applies paint product to the surfaces. Brake rotors or drums are heated using an oven after the coating has been applied. Associated flash-off areas/drying area allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	07-01-06	FG-Zinc FG-MACT MMMM
EU-Zinc-03 (Brentro 01)	Brake rotors or drums are pre-heated using an oven and HVLP spray guns apply the coating to multiple surfaces of automotive brake products. The coating line applies coating to several surfaces on brake rotors and brake drums. A paint booth applies paint product to the surfaces and associated flash-off area/drying area that allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	07-01-06	FG-Zinc FG-MACT MMMM
EU-Zinc-04 (Brentro 02)	Brake rotors or drums are pre-heated using an oven and HVLP spray guns apply the coating to multiple surfaces of automotive brake products. The coating line applies coating to several surfaces on brake rotors and brake drums. A paint booth applies paint product to the surfaces and associated flash-off area/drying area that allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	05-01-09	FG-Zinc FG-MACT MMMM
EU-Zinc-05-Blechtopf	Brake rotors or drums are pre-heated and dried following coating application, using electric induction heaters. The coating application is done in a spray booth using robotic HVLP spray applicators to apply coatings to multiple surfaces of automotive brake products. The spray booth will be equipped with dry filters to collect any overspray.	12-18-13	FG-Zinc FG-MACT MMMM

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EU-Magni-01	Brake rotors or drums are pre-heated using an oven and HVLP spray guns apply the coating to multiple surfaces of automotive brake products. The coating line applies coating to several surfaces on brake rotors and brake drums. A paint booth applies paint product to the surfaces and associated flash-off area/drying area that allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	05-01-10	FG-Magni&Black FG-MACT MMMM
EU-Magni-02	Brake rotors or drums are pre-heated using an oven and HVLP spray guns apply the coating to multiple surfaces of automotive brake products. The coating line applies coating to several surfaces on brake rotors and brake drums. A paint booth applies paint product to the surfaces and associated flash-off area/drying area that allow the brake products to dry or cure. Dry filters are used to collect any over spray from the coating process.	08-01-11	FG-Magni&Black FG-MACT MMMM
EU-Magni-03	Brake rotors or drums are pre-heated and dried following coating application, using electric induction heaters. The coating application is done in a spray booth using robotic HVLP spray applicators to apply coatings to multiple surfaces of automotive brake products. The spray booth will be equipped with dry filters to collect any overspray.	11-20-13	FG-Magni&Black FG-MACT MMMM
EU-Magni-04	Brake rotors or drums are pre-heated and dried following coating application, using electric induction heaters. The coating application is done in a spray booth using robotic HVLP spray applicators to apply coatings to multiple surfaces of automotive brake products. The spray booth will be equipped with dry filters to collect any overspray.	12-18-13	FG-Magni&Black FG-MACT MMMM
EU-Magni-05	Brake rotors or drums are pre-heated and dried following coating application, using electric induction heaters. The coating application is done in a spray booth using robotic HVLP spray applicators to apply coatings to multiple surfaces of automotive brake products. The spray booth will be equipped with dry filters to collect any overspray.	04-01-14	FG-Magni&Black FG-MACT MMMM

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EU-COLDCLEANERS	Any cold cleaner that is grandfathered or exempt from Rule 201 pursuant to Rule 281(h), or Rule 285(r)(iv). Existing cold cleaners were placed into operation prior to July 1, 1979. New cold cleaners were placed into operation on or after July 1, 1979.	02-01-01	FG-COLDCLEANERS

D. FLEXIBLE GROUP CONDITIONS

Part D outlines the terms and conditions that apply to more than one emission unit. The permittee is subject to the special conditions for each flexible group in addition to the General Conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply, NA (not applicable) has been used in the table. If there are no special conditions that apply to more than one emission unit, this section will be left blank.

FLEXIBLE GROUP SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FG-GeoMet	Two automotive metal surface coating lines.	EU-GeoMet-01 EU-GeoMet-02
FG-Magni&Black	Six automotive metal surface coating lines.	EU-Black EU-Magni-01 EU-Magni-02 EU-Magni-03 EU-Magni-04 EU-Magni-05
FG-Zinc	Five automotive metal surface coating lines.	EU-Zinc-01 EU-Zinc-02 EU-Zinc-03 EU-Zinc-04 EU-Zinc-05-Blechtopf
FG-MISCMETAL	All metal parts coating lines operating per the requirements of R 336.1621(10)(b), including equipment covered by other permits and exempt equipment.	EU-GeoMet-01 EU-GeoMet-02
FG-MACT MMMM	Each new, reconstructed, and existing affected source described in 40 CFR 63.3881(a)(1), including the subcategories listed in 40 CFR, Part 63, Subpart MMMM, 63.3881(a)(2) through (6), meeting the applicability requirements of 40 CFR 63.3881(b), which is engaged in the surface coating of miscellaneous metal parts and products. The affected source includes the collection of all the items listed in 40 CFR 63.3882(b)(1) through (4). Surface coating is defined by 40 CFR 63.3881 as the application of coating to a substrate using, for example, spray guns or dip tanks. Surface coating also includes associated activities, such as surface preparation, cleaning, mixing, and storage if they are directly related to the application of the coating. The 40 CFR, Part 63, Subpart MMMM, does not apply to surface coating or a coating operation that meets any of the criteria of 40 CFR 63.3881(c)(1) through (17).	EU-GeoMet-01 EU-GeoMet-02 EU-Black EU-Magni-01 EU-Magni-02 EU-Magni-03 EU-Magni-04 EU-Magni-05 EU-Zinc-01 EU-Zinc-02 EU-Zinc-03 EU-Zinc-04 EU-Zinc-05-Blechtopf

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FG-COLDCLEANERS	Any cold cleaner that is grandfathered or exempt from Rule 201 pursuant to Rule 281(h), or Rule 285(r)(iv). Existing cold cleaners were placed into operation prior to July 1, 1979. New cold cleaners were placed into operation on or after July 1, 1979.	EU-COLDCLEANERS

FG-GeoMet
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Two automotive metal surface coating lines.

Emission Units: EU-GeoMet-01, EU-GeoMet-02

POLLUTION CONTROL EQUIPMENT

Dry filters are used to collect any overspray from the coating process.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOCs	2,000 pounds per month[2]	Calendar month	Each EU of FG-GeoMet	SC VI.1 through SC VI.3	**R 336.1702(d)**
2. VOCs	9.7 tpy[2]	12-month rolling time period as determined at the end of each calendar month	FG-GeoMet	SC VI.1 through SC VI.3	**R 336.1702(d)**

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall capture all waste coatings, cleanup and purge solvents (materials) and shall store them in closed containers. The permittee shall dispose of all waste materials in an acceptable manner in compliance with all applicable state rules and federal regulations.[2] **(R 336.1702(a))**

2. The permittee shall dispose of spent filters in a manner which minimizes the introduction of air contaminants to the outer air.[2] **(R 336.1224, R 336.1370)**

3. The permittee shall handle all VOC and / or HAP containing materials, including coatings, reducers, solvents and thinners, in a manner to minimize the generation of fugitive emissions. The permittee shall keep containers covered at all times except when operator access is necessary.[2] **(R 336.1205, R 336.1225, R 336.1702(a))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate FG-GeoMet unless all respective exhaust filters are installed, maintained and operated in a satisfactory manner.[2] **(R 336.1224, R 336.1301, R 336.1910)**

2. The permittee shall equip and maintain FG-GeoMet with HVLP applicators or comparable technology with equivalent transfer efficiency. For HVLP applicators, the permittee shall keep test caps available for pressure testing.[2] **(R 336.1702(a))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall determine the VOC content, water content and density of any coating, as applied and as received, using federal Reference Test Method 24. Upon prior written approval by the AQD District Supervisor, the permittee may determine the VOC content from manufacturer's formulation data. If the Method 24 and the formulation values should differ, the permittee shall use the Method 24 results to determine compliance.[2] **(R 336.1702, R 336.2001, R 336.2003, R 336.2004, R 336.2040(5))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the 15th day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition.[2] **(R 336.1225, R 336.1702)**

2. The permittee shall maintain a current listing from the manufacturer of the chemical composition of each coating, cleanup and purge solvents, including the weight percent of each component. The data may consist of Material Safety Data Sheets, manufacturer's formulation data, or both as deemed acceptable by the AQD District Supervisor. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1225, R 336.1702)**

3. The permittee shall keep the following information on a calendar day basis for FG-GeoMet:
   a. Gallons (with water) of each coating, cleanup and purge solvents (material) used and reclaimed.
   b. VOC content (with water) of each material as applied.
   c. VOC mass emission calculations determining the monthly emission rate in pounds per calendar month for each EU of FG-GeoMet.
   d. VOC mass emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month for FG-GeoMet.

   The permittee shall keep the records in a format acceptable to the AQD District Supervisor and make them available to the Department upon request.[2] **(R 336.1702(d))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-GeoMet-01 (Paint Booth - SV0042)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
2. SV-GeoMet-02 (Paint Booth - SV0043)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
3. SV-GeoMet-03 (Cure Station - SV0045)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
4. SV-GeoMetII-01 (Paint Booth - SV0053)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
5. SV-GeoMetII-02 (Paint Booth - SV0054)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
6. SV-GeoMetII-03 (Cure Station - SV0056)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR Part 63, Subpart A and Subpart MMMM for Surface Coating of Miscellaneous Metal Parts and Products.[2] **(40 CFR Part 63 Subparts A and MMMM)**

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-Magni&Black
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Six automotive metal surface coating lines.

Emission Units: EU-Black, EU-Magni-01, EU-Magni-02, EU-Magni-03, EU-Magni-04, EU-Magni-05

POLLUTION CONTROL EQUIPMENT

Dry filters are used to collect any overspray from the coating process.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOCs	9.4 tpy[2]	12-month rolling time period as determined at the end of each calendar month	FG-Magni&Black	SC VI.2 SC VI.3	**R 336.1702(a)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOCs	3.5 lb/gal (minus water)[a] as applied[2]	Instantaneous	FG-Magni&Black	SC V.1	**R 336.1702(a)**

[a] The phrase "minus water" shall also include compounds which are used as organic solvents and which are excluded from the definition of volatile organic compound. **(R 336.1602(4))**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall capture all waste coatings, cleanup and purge solvents (materials) and shall store them in closed containers. The permittee shall dispose of all waste materials in an acceptable manner in compliance with all applicable state rules and federal regulations.[2] **(R 336.1702(a))**

2. The permittee shall dispose of spent filters in a manner which minimizes the introduction of air contaminants to the outer air.[2] **(R 336.1224, R 336.1370)**

3. The permittee shall handle all VOC and / or HAP containing materials, including coatings, reducers, solvents and thinners, in a manner to minimize the generation of fugitive emissions. The permittee shall keep containers covered at all times except when operator access is necessary.[2] **(R 336.1205, R 336.1225, R 336.1702(a))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate FG-Magni&Black unless all respective exhaust filters are installed, maintained and operated in a satisfactory manner.[2] **(R 336.1224, R 336.1301, R 336.1910)**

2. The permittee shall equip and maintain FG-Magni&Black with HVLP applicators or comparable technology with equivalent transfer efficiency. For HVLP applicators, the permittee shall keep test caps available for pressure testing.[2] **(R 336.1702(a))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall determine the VOC content, water content and density of any coating, as applied and as received, using federal Reference Test Method 24. Upon prior written approval by the AQD District Supervisor, the permittee may determine the VOC content from manufacturer's formulation data. If the Method 24 and the formulation values should differ, the permittee shall use the Method 24 results to determine compliance.[2] **(R 336.1702, R 336.2001, R 336.2003, R 336.2004, R 336.2040(5))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the 15th day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition.[2] **(R 336.1225, R 336.1702)**

2. The permittee shall maintain a current listing from the manufacturer of the chemical composition of each coating, cleanup and purge solvents, including the weight percent of each component. The data may consist of Material Safety Data Sheets, manufacturer's formulation data, or both as deemed acceptable by the AQD District Supervisor. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1225, R 336.1702)**

3. The permittee shall keep the following information on a calendar month basis for FG-Magni&Black:
   a. Gallons (with water) of each coating, cleanup and purge solvents (material) used and reclaimed.
   b. VOC content (minus water and with water) of each material as applied.
   c. VOC mass emission calculations determining the monthly emission rate in tons per calendar month.
   d. VOC mass emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month.

   The permittee shall keep the records in a format acceptable to the AQD District Supervisor and make them available to the Department upon request.[2] **(R 336.1702(a))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-SprimagBlack (Exhaust - SV0021)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
2. SV-Magni-01 (Exhaust - SV0052)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
3. SV-Magni-02 (Exhaust - SV0060)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
4. SV-Magni-03 (Exhaust - SV0063)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
5. SV-Magni-04 (Exhaust - SV0064)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
6. SV-Magni-05 (Exhaust - SV0065)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR Part 63, Subpart A and Subpart MMMM for Surface Coating of Miscellaneous Metal Parts and Products.[2] **(40 CFR Part 63 Subparts A and MMMM)**

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-Zinc
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Five automotive metal surface coating lines.

Emission Units: EU-Zinc-01, EU-Zinc-02, EU-Zinc-03, EU-Zinc-04, EU-Zinc-05-Blechtopf

POLLUTION CONTROL EQUIPMENT

Dry filters are used to collect any overspray from the coating process.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOCs	43.5 tpy[2]	12-month rolling time period as determined at the end of each calendar month	FG-Zinc	SC VI.2 SC VI.3	**R 336.1702(a)**
2. Xylene (CAS No. 1330-20-7)	103.5 pounds per day[1]	Calendar day	FG-Zinc	SC VI.2 SC VI.4	**R 336.1225(1)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOCs	3.5 lb/gal (minus water)[a] as applied[2]	Instantaneous	FG-Zinc	SC V.1	**R 336.1702(a)**

[a] The phrase "minus water" shall also include compounds which are used as organic solvents and which are excluded from the definition of volatile organic compound. **(R 336.1602(4))**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall capture all waste coatings, cleanup and purge solvents (materials) and shall store them in closed containers. The permittee shall dispose of all waste materials in an acceptable manner in compliance with all applicable state rules and federal regulations.[2] **(R 336.1702(a))**

2. The permittee shall dispose of spent filters in a manner which minimizes the introduction of air contaminants to the outer air.[2] **(R 336.1224, R 336.1370)**

3. The permittee shall handle all VOC and / or HAP containing materials, including coatings, reducers, solvents and thinners, in a manner to minimize the generation of fugitive emissions. The permittee shall keep containers covered at all times except when operator access is necessary.[2] **(R 336.1205, R 336.1225, R 336.1702(a))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate FG-Zinc unless all respective exhaust filters are installed, maintained and operated in a satisfactory manner.[2] **(R 336.1224, R 336.1301, R 336.1910)**

2. The permittee shall equip and maintain FG-Zinc with HVLP applicators or comparable technology with equivalent transfer efficiency. For HVLP applicators, the permittee shall keep test caps available for pressure testing.[2] **(R 336.1702(a))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall determine the VOC content, water content and density of any coating, as applied and as received, using federal Reference Test Method 24. Upon prior written approval by the AQD District Supervisor, the permittee may determine the VOC content from manufacturer's formulation data. If the Method 24 and the formulation values should differ, the permittee shall use the Method 24 results to determine compliance.[2] **(R 336.1702, R 336.2001, R 336.2003, R 336.2004, R 336.2040(5))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the 15th day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition.[2] **(R 336.1225, R 336.1702)**

2. The permittee shall maintain a current listing from the manufacturer of the chemical composition of each coating, cleanup and purge solvents, including the weight percent of each component. The data may consist of Material Safety Data Sheets, manufacturer's formulation data, or both as deemed acceptable by the AQD District Supervisor. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1225, R 336.1702)**

3. The permittee shall keep the following information on a calendar month basis for FG-Zinc:
   a. Gallons (with water) of each coating, cleanup and purge solvents (material) used and reclaimed.
   b. VOC content (minus water and with water) of each material as applied.
   c. VOC mass emission calculations determining the monthly emission rate in tons per calendar month.
   d. VOC mass emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month.

   The permittee shall keep the records in a format acceptable to the AQD District Supervisor and make them available to the Department upon request.[2] **(R 336.1702(a))**

4. The permittee shall keep the following information on a calendar day basis for FG-Zinc:
   a. Gallons of each xylene (CAS No. 1330-20-7) containing material used and reclaimed.
   b. The xylene (CAS No. 1330-20-7) content in pounds per gallon of each material used.
   c. Xylene (CAS No. 1330-20-7) mass emission calculations determining the daily emission rate in pounds per calendar day.

   The permittee shall keep the records in a format acceptable to the AQD District Supervisor and make them available to the Department upon request.[1] **(R 336.1225(1))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-Zinc-01 (Exhaust - SV0026)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
2. SV-SprimagZinc-01 (Spray Station - SV0022)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
3. SV-SprimagZinc-02 (Flash Off - SV0023)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
4. SV-SprimagZinc-03 (Cooling Zone - SV0025)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
5. SV-BrentroZinc-01 (Exhaust - SV0048)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
6. SV-BrentroZinc-02 (Exhaust - SV0059)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
7. SV-Blechtopf-01 (Spray Station - SV0061)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
8. SV-Blechtopf-02 (Drying Area - SV0062)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR Part 63, Subpart A and Subpart MMMM for Surface Coating of Miscellaneous Metal Parts and Products.[2] **(40 CFR Part 63 Subparts A and MMMM)**

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-MISCMETAL
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

All metal parts coating lines operating per the requirements of R 336.1621(10)(b), including equipment covered by other permits and exempt equipment.

Emission Units: EU-GeoMet-01, EU-GeoMet-02

POLLUTION CONTROL EQUIPMENT

Dry filters are used to collect any overspray from the coating process.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOC	Less than 30.0 tpy[2]	12-month rolling time period as determined at the end of each calendar month	All metal parts coating lines operating per the requirements of R 336.1621(10)(b).	SC VI.2 SC VI.3	**R 336.1702(d)**

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the 15th day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition.[2] **(R 336.1205(3))**

2. The permittee shall maintain a current listing from the manufacturer of the chemical composition of each coating and reducer including the weight percent of each component. The data may consist of Material Safety Data Sheets, manufacturer's formulation data, or both as deemed acceptable by the AQD District Supervisor. The

permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1702(d))**

3. The permittee shall keep the following information on a calendar day basis for all metal parts coating lines operating per the requirements of R 336.1621(10)(b):
   a. Gallons or pounds of each VOC containing coating used.
   b. VOC content, in pounds per gallon or pounds per pound, of each VOC containing coating used.
   c. VOC emission calculations determining the monthly emission rate in tons per calendar month.
   d. VOC emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month from the coating of metal parts.

   The permittee shall keep the records in a format acceptable to the AQD District Supervisor. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1702(d))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
NA	NA	NA	NA

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-MACT MMMM
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Each new, reconstructed, and existing affected source described in 40 CFR 63.3881(a)(1), including the subcategories listed in 40 CFR, Part 63, Subpart MMMM, 63.3881(a)(2) through (6), meeting the applicability requirements of 40 CFR 63.3881(b), which is engaged in the surface coating of miscellaneous metal parts and products. The affected source includes the collection of all the items listed in 40 CFR 63.3882(b)(1) through (4). Surface coating is defined by 40 CFR 63.3881 as the application of coating to a substrate using, for example, spray guns or dip tanks. Surface coating also includes associated activities, such as surface preparation, cleaning, mixing, and storage if they are directly related to the application of the coating. 40 CFR, Part 63, Subpart MMMM, does not apply to surface coating or a coating operation that meets any of the criteria of 40 CFR 63.3881(c)(1) through (17).

Emission Units: EU-GeoMet-01, EU-GeoMet-02, EU-Black, EU-Magni-01, EU-Magni-02, EU-Magni-03, EU-Magni-04, EU-Magni-05, EU-Zinc-01, EU-Zinc-02, EU-Zinc-03, EU-Zinc-04, EU-Zinc-05-Blechtopf

POLLUTION CONTROL EQUIPMENT

Dry filters are used to collect any overspray from the coating process.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Organic HAP	2.6 lb/gal of coating solids[2]	12-month rolling time period as determined at the end of each calendar month	Existing – General Use Coating	SC VI.1 through SC VI.5	**40 CFR 63.3890(b)(1)**

II. MATERIAL LIMIT(S)

For the compliant materials option, the permittee shall meet the material limits specified in the following table.

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Each Thinner and/or Additive	No Organic HAP[2] *	Instantaneous	Each Coating Operation using Compliant Material Option	SC VI.1 through SC VI.5	**40 CFR 63.3891(a)**
2. Each Cleaning Material	No Organic HAP[2] *	Instantaneous	Each Coating Operation using Compliant Material Option	SC VI.1 through SC VI.5	**40 CFR 63.3891(a)**
* Determined according to 40 CFR 63.3941(a).					

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall determine whether the organic HAP emission rate is equal to or less than the applicable emission limits in 40 CFR 63.3890 using at least one of the following three options, which are listed in 40 CFR 63.3891(a) through (c):
   a. Compliant material option,
   b. Emission rate without add-on controls option, or
   c. Emission rate with add-on controls option.

The permittee shall include all coatings, thinners, and/or other additives, and cleaning materials used when determining the emission rate.[2] **(40 CFR 63.3891)**

2. Any coating operation(s) using the compliant material option or the emission rate without add-on controls option, shall be in compliance with the applicable emission limits in 40 CFR 63.3890 at all times.[2] **(40 CFR 63.3900(a)(1))**

3. If the surface coating operation(s) meet the applicability criteria of more than one of the subcategory emission limits specified in 40 CFR 63.3890(a) or (b), the permittee may comply separately with each subcategory emission limit, or comply using one of the alternatives in 40 CFR 63.3890(c)(1) or (2).[2] **(40 CFR 63.3890(c))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall conduct an initial compliance demonstration for the initial compliance period according to the requirements in 40 CFR 63.3941, 40 CFR 63.3951, or 40 CFR 63.3961. The initial compliance period begins on the applicable compliance date specified in 40 CFR 63.3883 and ends on the last day of the 12th month following the compliance date. If the compliance date occurs on any day other than the first of the month, then the compliance period extends through that month plus the next 12 months.[2] **(40 CFR 63.3940, 40 CFR 63.3950, 40 CFR 63.3960)**

2. The permittee shall keep all records required by 40 CFR 63.3930 in the format and timeframes outlined in 40 CFR 63.3931.[2] **(40 CFR 63.3942(d), 40 CFR 63.3952(d), 40 CFR 63.3963(j))**

3. The permittee shall maintain, at a minimum, the following records for each compliance period[2]:
   a. A copy of each notification and report that is submitted to comply with Subpart MMMM, and the documentation supporting each notification and report. **(40 CFR 63.3930(a))**
   b. A current copy of information provided by materials suppliers or manufacturers, such as manufacturer's formulation data, or test data used to determine the mass fraction of organic HAP and density of each coating, thinner and/or other additive, and cleaning material, and the volume fraction of coating solids for each coating. **(40 CFR 63.3930(b))**
   c. A list of the coating operations on which each compliance option was used, and the beginning and ending dates and times for each compliance option used. **(40 CFR 63.3930(c)(1))**
   d. For the compliant materials option, the calculation of the organic HAP content for each coating, using Equation 2 of 40 CFR 63.3941. **(40 CFR 63.3930(c)(2))**
   e. For the emission rate without add-on controls option, the calculation of the total mass of organic HAP emissions for the coatings, thinners and/or additives, and cleaning materials used each month using Equations 1, 1A through 1C and 2 of 40 CFR 63.3951; and, if applicable, the calculation used to determine mass of organic HAP in waste materials according to 40 CFR 63.3951(e)(4); the calculation of the total volume of coating solids used each month using Equation 2 of 40 CFR 63.3951; and the calculation of each 12-month organic HAP emission rate using Equation 3 of 40 CFR 63.3951. **(40 CFR 63.3930(c)(3))**
   f. The name and mass or volume of each coating, thinner and/or other additive, and cleaning material used during each compliance period. If the compliant material option is used for all coatings at the affected source, the permittee may maintain purchase records for each material used rather than a record of the volume used. **(40 CFR 63.3930(d))**
   g. The mass fraction of organic HAP for each coating, thinner and/or additive, and cleaning material used during each compliance period unless the material is tracked by weight. **(40 CFR 63.3930(e))**

h. The volume fraction of coating solids for each coating used during each compliance period. **(40 CFR 63.3930(f))**

i. The density of for each coating, thinner and/or other additive, and cleaning material used during each compliance period. **(40 CFR 63.3930(g))**

j. The information specified in 40 CFR 63.3930(h)(1) through (3), if an allowance is used in Equation 1 of 40 CFR 63.3951 for organic HAP contained in waste materials sent to or designated for shipment to a treatment, storage, and disposal facility (TSDF) according to 40 CFR 63.3951(e)(4). **(40 CFR 63.3930(h))**

k. The date, time, and duration of each deviation. **(40 CFR 63.3930(j))**

4. For each coating used for the compliant coating option, the permittee shall demonstrate continuous compliance with the emission limit in 40 CFR 63.3890, for each compliance period, using Equation 2 of 40 CFR 63.3941. For each thinner and cleaning material used, the permittee shall determine continuous compliance according to 40 CFR 63.3941(a).[2] **(40 CFR 63.3942)**

5. For any coating operation or group of coating operations using the emission rate without add-on controls option, the permittee shall demonstrate continuous compliance with the applicable organic HAP emission limit in 40 CFR 63.3890, for each compliance period, according to 40 CFR 63.3951(a) through (g).[2] **(40 CFR 63.3952)**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. For the compliant material option, if any coating used for any 12-month compliance period exceeds the applicable emission limit specified in 40 CFR 63.3890; or any thinner or cleaning material used contains any organic HAP, the permittee shall report this as a deviation as specified in 40 CFR 63.3910(c)(6) and 40 CFR 63.3920(a)(5).[2] **(40 CFR 63.3942(b))**

5. For the emission rate without add-on controls, if the organic HAP emission rate for any 12-month compliance period exceeds the applicable emission limit specified in 40 CFR 63.3890, the permittee shall report this as a deviation as specified in 40 CFR 63.3910(c)(6) and 40 CFR 63.3920(a)(6).[2] **(40 CFR 63.3952(b))**

6. The Permittee shall submit the applicable notifications specified in 40 CFR 63.7(b) and (c), 63.8(f)(4) and 63.9(b) through (e) and (h), an initial notification and a notification of compliance status as specified in 40 CFR 63.3910.[2] **(40 CFR Part 63 Subparts A and MMMM)**

7. The permittee shall submit all semiannual compliance reports specified in 40 CFR 63.3920(a). Each semiannual compliance report shall identify which coating operation(s) used each compliance option, and if there were no deviations from the emission limitations in 40 CFR 63.3890, include a statement that the coating operations were in compliance.[2] **(40 CFR 63.3920, 40 CFR 63.3942(c), 40 CFR 63.3952(c), 40 CFR 63.3963(f))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
NA	NA	NA	NA

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR Part 63, Subpart A and Subpart MMMM for Surface Coating of Miscellaneous Metal Parts and Products by the initial compliance date.[2] **(40 CFR Part 63 Subparts A and MMMM)**

Footnotes:
[1]This condition is state-only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-COLDCLEANERS
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Any cold cleaner that is grandfathered or exempt from Rule 201 pursuant to Rule 278 and Rule 281(h), or Rule 285(r)(iv). Existing cold cleaners were placed into operation prior to July 1, 1979. New cold cleaners were placed into operation on or after July 1, 1979.

Emission Unit: EU-COLDCLEANERS

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

NA

II. MATERIAL LIMIT(S)

1. The permittee shall not use cleaning solvents containing more than five percent by weight of the following halogenated compounds: methylene chloride, perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, chloroform, or any combination thereof. **(R 336.1213(2))**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. Cleaned parts shall be drained for no less than 15 seconds or until dripping ceases. **(R 336.1611(2)(b), R 336.1707(3)(b))**

2. The permittee shall perform routine maintenance on each cold cleaner as recommended by the manufacturer. **(R 336.1213(3))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The cold cleaner must meet one of the following design requirements:
   a. The air/vapor interface of the cold cleaner is no more than ten square feet. **(R 336.1281(h))**
   b. The cold cleaner is used for cleaning metal parts and the emissions are released to the general in-plant environment. **(R 336.1285(r)(iv))**

2. The cold cleaner shall be equipped with a device for draining cleaned parts. **(R 336.1611(2)(b), R 336.1707(3)(b))**

3. All new and existing cold cleaners shall be equipped with a cover and the cover shall be closed whenever parts are not being handled in the cold cleaner. **(R 336.1611(2)(a), R 336.1707(3)(a))**

4. The cover of a new cold cleaner shall be mechanically assisted if the Reid vapor pressure of the solvent is more than 0.3 psia or if the solvent is agitated or heated. **(R 336.1707(3)(a))**

5. If the Reid vapor pressure of any solvent used in a new cold cleaner is greater than 0.6 psia; or, if any solvent used in a new cold cleaner is heated above 120 degrees fahrenheit, then the cold cleaner must comply with at least one of the following provisions:
   a. The cold cleaner must be designed such that the ratio of the freeboard height to the width of the cleaner is equal to or greater than 0.7. **(R 336.1707(2)(a))**
   b. The solvent bath must be covered with water if the solvent is insoluble and has a specific gravity of more than 1.0. **(R 336.1707(2)(b))**

c. The cold cleaner must be controlled by a carbon adsorption system, condensation system, or other method of equivalent control approved by the AQD. **(R 336.1707(2)(c))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. For each new cold cleaner in which the solvent is heated, the solvent temperature shall be monitored and recorded at least once each calendar week during routine operating conditions. **(R 336.1213(3))**

2. The permittee shall maintain the following information on file for each cold cleaner **(R 336.1213(3))**:
   a. A serial number, model number, or other unique identifier for each cold cleaner.
   b. The date the unit was installed, manufactured or that it commenced operation.
   c. The air/vapor interface area for any unit claimed to be exempt under Rule 281(h).
   d. The applicable Rule 201 exemption.
   e. The Reid vapor pressure of each solvent used.
   f. If applicable, the option chosen to comply with Rule 707(2).

3. The permittee shall maintain written operating procedures for each cold cleaner. These written procedures shall be posted in an accessible, conspicuous location near each cold cleaner. **(R 336.1611(3), R 336.1707(4))**

4. As noted in Rule 611(2)(c) and Rule 707(3)(c), if applicable, an initial demonstration that the waste solvent is a safety hazard shall be made prior to storage in non-closed containers. If the waste solvent is a safety hazard and is stored in non-closed containers, verification that the waste solvent is disposed of so that not more than 20 percent, by weight, is allowed to evaporate into the atmosphere shall be made on a monthly basis. **(R 336.1213(3), R 336.1611(2)(c), R 336.1707(3)(c))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

NA

IX. OTHER REQUIREMENT(S)

NA

E. NON-APPLICABLE REQUIREMENTS

At the time of the ROP issuance, the AQD has determined that no non-applicable requirements have been identified for incorporation into the permit shield provision set forth in the General Conditions in Part A pursuant to Rule 213(6)(a)(ii).

APPENDICES

Appendix 1. Abbreviations and Acronyms

The following is an alphabetical listing of abbreviations/acronyms that may be used in this permit.

AQD	Air Quality Division	MM	Million
acfm	Actual cubic feet per minute	MSDS	Material Safety Data Sheet
BACT	Best Available Control Technology	MW	Megawatts
BTU	British Thermal Unit	NA	Not Applicable
°C	Degrees Celsius	NAAQS	National Ambient Air Quality Standards
CAA	Federal Clean Air Act	NESHAP	National Emission Standard for Hazardous Air Pollutants
CAM	Compliance Assurance Monitoring	NMOC	Non-methane Organic Compounds
CEM	Continuous Emission Monitoring	NOx	Oxides of Nitrogen
CFR	Code of Federal Regulations	NSPS	New Source Performance Standards
CO	Carbon Monoxide	NSR	New Source Review
COM	Continuous Opacity Monitoring	PM	Particulate Matter
department	Michigan Department of Environmental Quality	PM-10	Particulate Matter less than 10 microns in diameter
dscf	Dry standard cubic foot	pph	Pound per hour
dscm	Dry standard cubic meter	ppm	Parts per million
EPA	United States Environmental Protection Agency	ppmv	Parts per million by volume
EU	Emission Unit	ppmw	Parts per million by weight
°F	Degrees Fahrenheit	PS	Performance Specification
FG	Flexible Group	PSD	Prevention of Significant Deterioration
GACS	Gallon of Applied Coating Solids	psia	Pounds per square inch absolute
GC	General Condition	psig	Pounds per square inch gauge
gr	Grains	PeTE	Permanent Total Enclosure
HAP	Hazardous Air Pollutant	PTI	Permit to Install
Hg	Mercury	RACT	Reasonable Available Control Technology
hr	Hour	ROP	Renewable Operating Permit
HP	Horsepower	SC	Special Condition
H_2S	Hydrogen Sulfide	scf	Standard cubic feet
HVLP	High Volume Low Pressure *	sec	Seconds
ID	Identification (Number)	SCR	Selective Catalytic Reduction
IRSL	Initial Risk Screening Level	SO_2	Sulfur Dioxide
ITSL	Initial Threshold Screening Level	SRN	State Registration Number
LAER	Lowest Achievable Emission Rate	TAC	Toxic Air Contaminant
lb	Pound	Temp	Temperature
m	Meter	THC	Total Hydrocarbons
MACT	Maximum Achievable Control Technology	tpy	Tons per year
MAERS	Michigan Air Emissions Reporting System	µg	Microgram
MAP	Malfunction Abatement Plan	VE	Visible Emissions
MDEQ	Michigan Department of Environmental Quality	VOC	Volatile Organic Compounds
mg	Milligram	yr	Year
mm	Millimeter		

*For HVLP applicators, the pressure measured at the gun air cap shall not exceed 10 pounds per square inch gauge (psig).

Appendix 2. Schedule of Compliance

The permittee certified in the ROP application that this stationary source is in compliance with all applicable requirements and the permittee shall continue to comply with all terms and conditions of this ROP. A Schedule of Compliance is not required. **(R 336.1213(4)(a), R 336.1119(a)(ii))**

Appendix 3. Monitoring Requirements

Specific monitoring requirement procedures, methods or specifications are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 4. Recordkeeping

Specific recordkeeping requirement formats and procedures are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 5. Testing Procedures

Specific testing requirement plans, procedures, and averaging times are detailed in the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 6. Permits to Install

The following table lists any PTI and/or Operate that relate to the identified emission units or flexible groups as of the effective date of this ROP. This includes all PTI and/or Operate that are hereby incorporated into Source-Wide PTI No. MI-PTI-N6226-201X. The PTIs issued after the effective date of this ROP, including amendments or modifications, will be identified in Appendix 6 upon renewal.

Permit to Install Number	Description of Equipment	Corresponding Emission Unit(s) or Flexible Group(s)
145-12A	Thirteen automotive metal surface coating lines.	FG-GeoMet FG-Magni&Black FG-Zinc FG-MISCMETAL FG-MACT MMMM

Appendix 7. Emission Calculations

Specific emission calculations to be used with monitoring, testing or recordkeeping data are detailed in the appropriate Source-Wide, Emission Unit and/or Flexible group Special Conditions. Therefore, this appendix is not applicable.

Appendix 8. Reporting

A. Annual, Semiannual, and Deviation Certification Reporting

The permittee shall use the MDEQ, AQD, Report Certification form (EQP 5736) and MDEQ, AQD, Deviation Report form (EQP 5737) for the annual, semiannual and deviation certification reporting referenced in the Reporting Section of the Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Alternative formats must meet the provisions of Rule 213(4)(c) and Rule 213(3)(c)(i), respectively, and be approved by the AQD District Supervisor.

B. Other Reporting

Specific reporting requirement formats and procedures are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, Part B of this appendix is not applicable.

Appendix N
Air Dispersion Modeling Protocol

Craig Schmeisser

From: Butler, Eddie, FW-NA <Eddie.Butler@fritzwinter.us>
Sent: Friday, September 24, 2021 9:58 AM
To: Craig Schmeisser
Subject: FW: Air Dispersion Modeling Protocol - Fritz Winter North America (Franklin, KY)
Attachments: bwg_bna_2016-2020_FW.rar; Fritz Winter DAQ PSD Report 9-13-2021.xlsx; FLM_USFS_Request for Determination.doc; May RSL 2021.pdf

Eddie G Butler
EHS Manager
1 Fritz Winter Drive
Franklin, Kentucky 42134
Eddie.Butler@fritzwinter.us
Ofc: 270-813-4000 Ext 172

Best regards / Mit freundlichen Grüßen / Meilleures salutations

Eddie Butler
EHS Manager

Fritz Winter North America LP
1 Fritz Winter Drive
Franklin KY 42134
Vereinigte Staaten

Telephone number +1 270-813-4000 ext. 172
Mail: Eddie.Butler@fritzwinter.us
http://www.fritzwinter.com

Note: Privileged/Confidential information may be contained in this message and may be subject to legal privilege. Access to this e-mail by anyone other than the intended is unauthorised. If you are not the intended recipient (or responsible for delivery of the message to such person), you may not use, copy, distribute or deliver to anyone this message (or any part of its contents) or take any action in reliance on it. In such case, you should destroy this message, and notify us immediately. If you have received this email in error, please notify us immediately by e-mail or telephone and delete the e-mail from any computer. If you or your employer does not consent to internet e-mail messages of this kind, please notify us immediately. All reasonable precautions have been taken to ensure no viruses are present in this e-mail. As our company cannot accept responsibility for any loss or damage arising from the use of this e-mail or attachments we recommend that you subject these to your virus checking procedures prior to use. The views, opinions, conclusions and other informations expressed in this electronic mail are not given or endorsed by the company unless otherwise indicated by an authorized representative independent of this message.

From: Davis, Kevin D (EEC) <Kevin.Davis@ky.gov>
Sent: Friday, September 17, 2021 10:45 AM
To: Craig Schmeisser <craig.schmeisser@madriverstrategies.com>
Cc: Butler, Eddie, FW-NA <Eddie.Butler@fritzwinter.us>; Eric Tabor (etabor@taboraircompliance.com) <etabor@taboraircompliance.com>; Shewekah, Rick S (EEC) <Rick.Shewekah@ky.gov>; Hedge, Lauren B (EEC) <lauren.hedge@ky.gov>
Subject: RE: Air Dispersion Modeling Protocol - Fritz Winter North America (Franklin, KY)

Hello Craig,

Thank you for submitting the Fritz Winter Modeling protocol to the Division. With exception of a few comments, the protocol look to be in good order. Please find the KYDAQ protocol review comments below:

- *Section 2.1 Model Selection Summary – an equivalency demonstration for the MPI utilization must be provided in the modeling documentation, Section 3.2.2 (c) of Appendix W.*
- *Section 2.3 Meteorological data – the most recent meteorological data for the years 2016-2020 is being provided by the Division.*
- *Section 3.3 Significant Impact Area – the 2019 KY emission inventory spreadsheet, for all impacted KY counties, is being provided by the Division.*
- *Section 3.4.2 PM_{10} and $PM_{2.5}$ Increment Inventory – model should include any new increment consuming sources in the significant impact area (SIA).*
- *Section 3.5 Pre-Construction Monitoring Analysis – Please submit a formal request letter (for all pollutants, pre-construction monitoring waiver)to the Division for approval. The email can be addressed to Melissa Duff (melissa.duff@ky.gov) – please Cc Rick Shewekah and myself.*
- *Section 3.6 Background Concentrations – provide justification of representative nature of new Nashville monitor in the modeling document.*
- *Section Class I Area PSD Analysis – complete the attached FLM/USFS Request for Determination form and submit to Pleas McNeel(pmcneel@fs.fed.us).*
- *Section 3.9 Air Toxics – utilize the air toxics screening values from the Region 9, MAY 2021 Regional Screening Level (RSL) table.*

Please find the EPA Region 4 protocol review comment below:

Kevin,

Thanks for providing this PSD modeling protocol to us. We have completed review of the protocol and offer the following comment:

Sections 3.4.1 and 3.4.2 – PM_{10} and $PM_{2.5}$ NAAQS and Increment Modeling Inventory

- *Since the original permit application was submitted in 2017, the PM_{10} and $PM_{2.5}$ NAAQS and PSD Increment modeling inventory should be revised to reflect any changes to existing sources or the addition of new sources in the area.*

Don't hesitate to let us know if you have any questions.

-Chris

Christopher M. Howard
Regional Meteorologist
US EPA Region 4
404/562-9036
Howard.chris@epa.gov

Feel free to contact me if you have any questions and/or comments.

Thank you,

Kevin Davis
KY Division for Air Quality

Program Planning – Evaluation Section
300 Sower, 2nd Floor, Frankfort, KY 40601
E:kevin.davis@ky.gov
T: 502-782-6593 |M:502-219-2699

From: Craig Schmeisser <craig.schmeisser@madriverstrategies.com>
Sent: Friday, September 3, 2021 2:18 PM
To: Davis, Kevin D (EEC) <Kevin.Davis@ky.gov>
Cc: Butler, Eddie, FW-NA <Eddie.Butler@fritzwinter.us>; Eric Tabor (etabor@taboraircompliance.com) <etabor@taboraircompliance.com>; Shewekah, Rick S (EEC) <Rick.Shewekah@ky.gov>
Subject: Air Dispersion Modeling Protocol - Fritz Winter North America (Franklin, KY)

****CAUTION** PDF attachments may contain links to malicious sites. Please contact the COT Service Desk ServiceCorrespondence@ky.gov for any assistance.**

Good afternoon Kevin,
Attached please find the modeling protocol discussed during yesterday's call. Please do not hesitate contacting me should you have any questions.

Regards.

Craig S. Schmeisser
Mad River Strategies, LLC
craig.schmeisser@madriverstrategies.com
614.425.6392

Air Dispersion Modeling Protocol

Document to Support Air Permit Application Correction

Fritz Winter North America LP

1 Fritz Way Franklin, Kentucky

August 2021

Mad River Strategies, LLC
08497 Plattner Road
New Bremen, OH 45869

Project 1027.003

mad river strategies llc

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Section 1
Introduction

1.1 Document Description and Purpose

This document provides the protocol for the air quality analysis portion of the permit application to demonstrate the permitted major stationary source has not and will not "cause or contribute" to a violation of any applicable National Ambient Air Quality Standard (NAAQS) or Prevention of Significant Deterioration (PSD) increment.

This protocol will also be used to demonstrate that the major stationary source will comply with 401 KAR 63:020 that regulates potential hazardous matter or toxics substances (i.e., toxic air pollutants – TAPs).

1.2 Facility and Location

Fritz Winter North America LP (FW) operates a gray iron foundry and machining operation to produce automotive parts, predominantly brake rotors as authorized by Air Quality Permit V-16-022 R1 (Air Permit) issued on November 25, 2017.

The facility is located at the Wilkey North Industrial Park located in Franklin (Simpson County), Kentucky. The facility is located approximately 5 miles north of Franklin and 13 miles south of Bowling Green along State Route 31W.

The Franklin, Kentucky location is listed under the Standard Industrial Classification (SIC) code of 3714 – Motor Vehicle Parts and Accessories. The maximum production capacity of the foundry and machining operation is based on 91,586 tons of molten gray iron poured per year.

1.3 Process Overview

Molten metal is produced by introducing metallic charge materials, alloys, and fluxes into one of the four electric induction furnaces (EIFs) located at the Franklin, Kentucky facility. The process of producing cast iron metal parts first involves fabricating a green sand mold and then filling the mold with molten iron. Once the metal cools and solidifies, the mold is broken to recover the cast metal part which then undergoes cleaning, machining, and painting. Sand from the broken mold is mechanically reclaimed and prepared for reuse as molding sand.

Emissions at the iron foundry and machining operations result primarily from EIF melting, pouring and mold cooling, shakeout, shotblast, grinding, sand handling, coremaking and coating. Particulate emissions from these operations are captured and controlled by a number of fabric filters . An acid scrubber controls the emission of amine gas used as a catalyst during the production of cores (i.e., coremaking).

A detailed description of each source and air pollution control device will be provided in the air permit application.

1.4 Project Background

As a result of Air Permit required initial performance testing, it was determined that certain established emission limitations were not met. This section identifies the units and pollutants where emission limitations were exceeded and provides a brief analysis of likely causes.

1.4.1 Applicable Permit Limits

In addition to and in concert with other applicable sections, Section B (Foundry Operations), Section B (Coating Operations) 3.c., Section D.5, Section D.7, Section G.4.e, Section G.4.h, Section G.5. and Section H.2. of Air Quality Permit V-16-022 R1 issued on November 25, 2017 includes provisions to conduct performance (emission) testing to verify compliance with permit established emission limitations.

During 2018 and prior to the installation of Control Device CU08 with Stack ST09 (identified in a format of Control Device ID/Stack ID, e.g., CU08/ST09 throughout this document), FW was to comply with Alternative Operating Scenario #2 provided for in Section H of the referenced air permit.

Alternative Operating Scenario #2 allowed the foundry to temporarily exhaust emission units EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59 to Baghouse CU01 (CU01/ST02) prior to the installation of CU08/ST09. Operating per Alternative Operating Scenario 2 is identified in the Air Permit as Phase 1 per the note at the bottom of the emission unit table provided in Section B (Foundry Operations).

When FW is conducting production activities under Alternative Operating Scenario #2, Section H.2 (i.e., Phase 1) of the air permit establishes PM, PM_{10} and $PM_{2.5}$ emission limitations for CU01/ST02 as shown in Table 1-1.

Table 1-1. PM/PM10/PM2.5 Emission Limitations - Phase 1

Control Device (Stack)	Emission Units Controlled	Type of Control and Pollutants Controlled	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02)	EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16, EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0010 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0010 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0006 gr/dscf 0.85 lb/hr 3.72 ton/yr

Section D.5 of the air permit provides the emission limitations for CU06/ST07 and CU11/ST12. These emission limits are effective when operating under Phase 1 as well as once the Baghouse CU08 is installed (i.e., Phase 2).

Section D.5 also identifies PM, PM_{10} and $PM_{2.5}$ emission limitations for CU01/ST02 and CU08/ST09 during Phase 2 (once Baghouse CU08/ST09 has been installed and the exhaust ducts from emission unit IDs EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59 moved from CU01/ST02 to CU08/ST09). [It is beneficial to note

the facility continues to operate the existing coating operations under Section H. Alternative Operating Scenario #1].

Table 1-2 below provides those Section D.5 identified PM, PM_{10} and $PM_{2.5}$ emission limitations during Phase 2 for CU01/ST02 and CU08/ST09 as well as PM, PM_{10} and $PM_{2.5}$ emission limitations during both Phase 1 and Phase 2 for CU06/ST07 and CU11/ST12.

Comparing Table 1-1 and 1-2 it is worth noting that CU01/ST02 PM, PM_{10} and $PM_{2.5}$ emission limitations did not change to reflect the movement of a number of particulate matter generating sources from CU01/ST02 to CU08/ST09 as the facility transitioned from Phase 1 to Phase 2 operations. Put another way, prior to transitioning to CU08/ST09, a number of units with condensable particulate matter emissions were ducted to CU01/ST02. The CU01/ST02 emission limitations were not altered to reflect the possibility of the increased condensable emissions associated with these units during Phase 1 operations.

Table 1-2. PM/PM10/PM2.5 Emission Limitations

Control Device (Stack)	Emission Units Controlled	Type of Control and Pollutants Controlled	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02)	EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0060 gr/dscf 0.850 lb/hr 3.72 ton/yr
CU06 (ST07)	EU22, EU23, EU24, EU26, EU27, EU28, EU29, EU30, EU31, EU32, EU53, EU54, EU55, EU56	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0015 gr/dscf 1.30 lb/hr 5.67 ton/yr
CU08 (ST09)	EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0015 gr/dscf 2.12 lb/hr 9.30 ton/yr
CU11 (ST12)	EU60, EU61, EU62, EU64, EU65	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0015 gr/dscf 0.792 lb/hr 3.47 ton/yr

Table 1-3 provides the volatile organic compound (VOC) and carbon monoxide (CO) emission limitations for CU1/ST02, CU07/ST08 (VOC only) and CU08/ST09. These emission limitations are effective under both Phase 1 and Phase 2. **Similar to the PM, PM_{10} and $PM_{2.5}$ issued identified above, CU08/ST09 has identified VOC and CO emissions rates that were not addressed within the emission limitations for CU01/ST02 when it was operating under Phase 1.**

Table 1-3. VOC and CO Emission Limitations

Stack or Vent	Emission Units Combined	BACT for VOC	BACT for CO
ST02	EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16	0.14 lb/hr; 0.61 ton/yr	2.11 lb/hr; 9.25 ton/yr
ST08	EU39, EU40, EU41, EU42	0.70 lb/hr; 1.67 ton/yr	N/A
ST09	EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59	20.8 lb/hr; 39.7 ton/yr	128 lb/hr; 235 ton/yr

Finally, Air Permit Section B.3.h. identifies performance test requirements for the Shakeout Conveyor (EU53) to determine compliance with VOC and CO BACT emission limits identified in Section B.2.e. and f. These emission limits are provided in Table 1-4 and apply during both Phase 1 and 2.

Table 1-4. VOC and CO Emission Limitations - Shakeout Conveyor (EU53)

Emission Unit	Emission Unit Description	BACT for VOC	BACT for CO
EU53	Shakeout Conveyor	0.10 lb/ton gray iron; 4.58 ton/yr	1.00 lb/ton gray iron; 25.3 lb/hr

1.4.2 Initial Performance Test Results (CU01/ST02) – Phase 1

During Phase 1 the initial performance testing was conducted for the Melt Shop Baghouse (CU01/ST02) and Sand System Baghouse (CU06/ST07) in November, 2018 and December, 2018. Results of those tests are provided in Table 1-5 and Table 1-6 for CU01/ST02 and CU06/ST07, respectively.

The CU06/ST07 results provided in Table 1-6 assumed the only source of VOC and/or CO emissions were from the Shakeout Conveyor (EU53), and therefore any VOC and CO emissions determined at the stack were assigned to the Shakeout Conveyor (EU53).

Table 1-5. November and December 2018 Test Results - CU01/ST02

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/hr)	CO (lb/hr)
Emission Limit	0.0010	0.0010	0.0006	0.14	2.11
Performance Test Result	0.00063	0.0017	0.0017	0.28	26.37

The performance test of the CU01/ST02 yielded results that exceeded the permitted emission rates for PM_{10}, $PM_{2.5}$, VOC, and CO. Again, as identified above, CU01/ST02 emission limitations in the Air Permit were not changed to reflect the emissions from the units temporarily ducted to CU01/ST02 during Phased 1 operations.

Table 1-6. November and December 2018 Test Results - CU06/ST07 and EU53

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/ton gray iron)	CO (lb/ton gray iron) (lb/hr)
Emission Limit	0.0025	0.0025	0.0015	0.1	1 25.3
Performance Test Result	0.00042	0.0120	0.012	0.2	0.3 5.13

The performance test of CU06/ST07 determined PM_{10} and $PM_{2.5}$ emissions exceeded applicable emission limits identified in Table 1-6 or correspondingly identified in Table 1-2.

As stated above, since CU06/ST07 was assumed to have no other sources of VOC and CO, it was inferred that those emission rates determined from testing CU06/ST07 were from the Shakeout Conveyor (EU53) and therefore indicated the Shakeout Conveyor exceeded the allowable VOC emission rate provided in Table 1-4.

1.4.3 Performance Testing Results – Phase 2

Section D.5 and D.6 of the Air Permit includes provisions to repeat performance testing following completion of Phase 2 construction activities. The Phase 2 construction activities included installation of Baghouse CU08/Stack ST09 and then moving the exhaust ducts for several emission units from CU01/ST02 to CU08/ST09.

The performance test was conducted and the resulting pollutants in excess of emission limitations were $PM_{2.5}$, VOC, and CO for CU01/ST02 and $PM_{2.5}$ and VOC from CU06/ST07 and EU53, respectively. Note $PM_{2.5}$ emissions from CU01/ST02 and CU06/ST02 were only slightly above permitted limitations as was the VOC emissions from EU53.

A summary of the performance test results are provided and compared to the corresponding emission limits in Table 1-7 and Table 1-8.

Table 1-7. March 2020 Test Results - CU01/ST02

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/hr)	CO (lb/hr)
Emission Limit	0.0010	0.0010	0.0006	0.14	2.11
Performance Test Result	0.00042	0.0007	0.0007	1.42	7.77

Table 1-8. March 2020 Test Results - CU06/ST07 and EU53

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/ton gray iron)	CO (lb/ton gray iron) (lb/hr)
Emission Limit	0.0025	0.0025	0.0015	0.1	1 25.3
Performance Test Result	0.00091	0.0018	0.0018	0.11	0.086 1.24

1.4.4 Other Test Results

In addition to the above tests, performance tests have been conducted on Acid Scrubber CU07 (Stack ST08) and the Phase 2 installation of the Sand/Mold Baghouse CU08 (Stack ST09). Considering the results, these performance tests identified other possible Air Permit changes that would be warranted including the following:

- Acid Scrubber (CU07/ST08), test conducted November 2018, yielded emissions of CO that were unexpected with no underlying permitted emission limitations. [It is believed this is an anomaly and no change is being made to the permit application]
- Acid Scrubber (CU07/ST08), test conducted November 2018, yielded emissions of VOC that were 84% of the allowable limit. This testing was conducted at a production rate which was approximately 13% of the allowable.

1.4.5 Performance Test Results Analysis

The following provides a discussion of the likely causes of the excess emissions.

CU01 and CU06 PM_{10} and $PM_{2.5}$ Emission Limit Exceedances

From reviewing the above PM results, the minimal PM outlet loading indicates the baghouses are performing extremely well at removing filterable PM. The results of the performance test show the measured emission rates meet the current permit PM BACT emission limitations. Potential causes of the emissions limit exceedance include:

- The exceedances of the PM_{10} and $PM_{2.5}$ emission limitation exceedances is the results of the prior permit application's failure to address condensable particulate emissions that can occur during foundry melting, pouring, cooling and/or shakeout operations. No foundry identified in the RACT/BACT/LAER Clearinghouse (RBLC) have PM_{10} and $PM_{2.5}$ emission rates, including condensable, at these low emission rates.
- As identified above, another reason the CU01/ST02 PM_{10} and $PM_{2.5}$ emission limitations were exceeded was a result of the additional emission units and their associated condensable particulate emissions venting to CU01/ST02 during Phase 1 while no accommodation was made in the Air Permit.

To address this issue a revised BACT evaluation will be conducted to determine appropriate PM_{10} and $PM_{2.5}$ emission rates for these operations.

CU01/ST02, CU06/ST07 and EU53 VOC/CO Emission Limit Exceedance
There are several factors that likely led to the excess VOC and CO emission limitations from these stacks and the emission unit. Those factors include the following:

- As identified above regarding the Phase 1 PM_{10} and $PM_{2.5}$ emission limitations, the Air Permit did not consider VOC and CO emission rates from the additional emission units vented to CU01 during Phase 1 when establishing the Air Permit limits.
- Second, VOC and CO emissions vary across pouring, cooling and shakeout based on a number of factors (e.g., cooling time). When assessing compliance with VOC and CO emission limitations it is important to aggregate the performance test results across the applicable stacks and compare those results against a grouped emissions limit for the selected units. The Air Permit did not provide for this allowance.
- Third, it doesn't appear the VOC Shakeout BACT determination accurately reflects the expected VOC emission rate. The prior BACT identified Waupaca Foundry as having a VOC emission limit of 0.1 lb/ton of metal. It is known Waupaca has not been able to demonstrate compliance with that emission limitation.
- Finally, we believe secondary capture of some emissions is occurring and being vented to these stacks resulting in greater emissions of VOC and CO.

To address the above issue a revised BACT evaluation will be conducted to determine appropriate VOC and CO emission rates for these operations. In addition, the revised Air Permit must allow for aggregation of VOC and CO emission rates across multiple air pollution control devices to allow permit flexibility when assessing compliance at the emission unit level.

1.5 Revisions to Previous Permit Applications

Given the results of the above performance tests, the knowledge of other available foundry emissions information and the ongoing Air Permit Monitoring and Recordkeeping, a revised permit application will be submitted to address the above emission limitation exceedances. These changes are summarized in Table 1-9, 1-10 and 1-11 by comparing the expected revised emission rates and BACT to the same values provided in the current Air Permit.

Important aspects of each table can be summarized as follows:

- The largest Table 1-9 increase is a result of revisions made to the Coremaking VOC emission rates. A violation did not occur due to the low production rate experienced during the test. The table shows a reduction in PM and PM_{10} potential emission rates.
- Table 1-10 shows a decrease in potential emissions of PM and PM_{10} with a slight increase in $PM_{2.5}$ emissions.
- Table 1-11 shows an overall potential increase in VOC and CO of 37.56 and 22.61 tpy, respectively for these stacks. [note: these differences do not equate to the same change identified in Table 1-9 due to other emission units not addressed in Tables 1-10 and 1-11.

In addition to the changes identified in Tables 1-10 and 1-11, the revised application will include requests for the following changes:

- Remove shotblast media limit as the emission factor is based on tons of metal processed;
- Change Section H, Alternative Operating Scenario 1, 1.c.Thinner Usage to reflect actual operations.
- Increase Core Wash usage to reflect actual usage rates;
- Add Rust Preventative and Snag Grinding emission units.
- Remove several emission units identified in the initial and revised permit application that will not be installed including Scrap Drying (EU03), Scrap Cleaning (EU04), Holding Furnace #1 (EU11), Holding Furnace #2 (EU12), Mold Shop Baghouse Waste Dust Silo (EU58), Gasoline Storage Tank (EU75), and Paint Booth #3 (EU70).

Table 1-9. Compare 2017 to 2021 Emissions Increase

Pollutant	PSD SER (tpy)	2017 Permit Modification		2021 Permit Revision	
		Emissions Increase (tpy)	PSD Permitting Required? (Yes/No)	Emissions Increase (tpy)	PSD Permitting Required? (Yes/No)
Filterable PM	25	43.3	Yes	34.28	Yes
PM_{10}	15	47.3	Yes	34.28	Yes
$PM_{2.5}$	10	30.9	Yes	34.28	Yes
SO_2	40	1.49	No	1.04	No
NO_x	40	28.5	No	18.04	No
VOC	40	79.1	No	112.27	Yes
CO	100	297	Yes	312.39	Yes
Lead	0.6	0.28	No	0.02	No

Table 1-10. Comparison of Current to Proposed PM BACT

Control Device (Stack)	CURRENT PERMIT (2017)			PROPOSED LIMITS (2021)		
	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02)	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0006 gr/dscf 0.850 lb/hr 3.72 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr
CU06 (ST07)	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0015 gr/dscf 1.30 lb/hr 5.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr
CU08 (ST09)	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0015 gr/dscf 2.12 lb/hr 9.30 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr
CU11 (ST12)	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0015 gr/dscf 0.792 lb/hr 3.47 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr
	Increase over Current Permit (2017) in tpy:			**-4.86**	**-4.86**	**9.92**

Table 1-11. Comparison of Current to Proposed VOC and CO BACT

Stack or Vent	CURRENT PERMIT (2017)		PROPOSED LIMITS (2021)	
	BACT for VOC	BACT for CO	BACT for VOC	BACT for CO
CU01 ST02	0.14 lb/hr; 0.61 ton/yr	2.11 lb/hr; 9.25 ton/yr	3.85 lb/hr; 4.85 ton/yr	2.11 lb/hr; 31.85 ton/yr
CU06 ST07 (Previously EU53)	0.10 lb/ton gray iron; 4.58 ton/yr	1.00 lb/ton gray iron; 25.3 lb/hr	0.528 lb/ton gray iron; 13.39 lb/hr 24.18 ton/yr	1.00 lb/ton gray iron; 25.30 lb/hr 45.79 ton/yr
CU07 ST08	0.70 lb/hr; 1.67 ton/yr	N/A	17.35 lb/hr; 31.38 ton/yr	N/A
CU08 ST09	20.8 lb/hr; 39.7 ton/yr	128 lb/hr; 235 ton/yr	12.98 lb/hr; 23.71 ton/yr	128 lb/hr; 234.74 ton/yr
	Increase over Current Permit (2017) in tpy:		**37.56**	**22.61**

1.6 Protocol Overview

As stated previously, this document provides the protocol for an air quality analysis portion of the permit application to demonstrate that the major stationary source will not "cause or contribute" to a violation of any applicable National Ambient Air Quality Standard (NAAQS) or Prevention of Significant Deterioration (PSD) increment. This protocol will also be used to demonstrate that the major stationary source will comply with 401 KAR 63:020 that regulates potential hazardous matter or toxics substances (i.e., toxic air pollutants – TAPs).

As the installation has not demonstrated compliance with a number of applicable emission units, this air permitting effort is viewed as a revision to the existing Air Permit. Similar to the initial and subsequent modeling this protocol proposes use of updated off-site ambient monitoring information to provide needed background concentrations while also integrating the most recent and available 5 years of meteorological information.

The stack parameters, including release heights, exhaust temperatures, exit velocities, and inside stack-diameters for the fabric filters and any other release points have been reviewed and updated as necessary and are provided in Section 4 of this document.

Emission rates for each modeled pollutant has been updated in the air permit application and are incorporated into this revised air dispersion modeling analysis.

1.7 NSR Applicability

The initial installation and subsequently issued permit estimated emissions above the Prevention of Significant Deterioration (PSD) major source threshold for carbon monoxide (CO). In addition, the project has significant emission rates of particulate matter (PM), PM with an aerodynamic diameter of less than 10 microns (PM_{10}), and PM with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$). Revised emissions calculations now project that potential volatile organic compounds (VOCs) emissions will now exceed the major source threshold.

The total emissions from the application to support the 2017 air permit along with the current emission increase from the revised permit application are shown in Table 1-9.

1.8 Air Quality Analysis

As part of the PSD review process, the completion of an air quality dispersion modeling analysis is required to demonstrate that potential impacts from the proposed project will not:

- Cause or contribute to a violation of any applicable NAAQS;
- Exceed a PSD increment; or
- Significantly Affect AQRVs in Class I areas.

This demonstration will be performed for PM_{10}, $PM_{2.5}$ and CO, the pollutants that require PSD review. Emissions of VOC is proposed to be addressed by Application of the EPA's Modeled Emission Rates for Precursors (MERPS).

A project subject to PSD regulations must demonstrate compliance with applicable National Ambient Air Quality Standards (NAAQS) and PSD increments through an air dispersion modeling analysis. To assist in the timely review of the modeling analysis that will be submitted with the complete air permit application, FW requests Kentucky Division for Air Quality's (KDAQ's) written approval of this proposed modeling protocol.

Section 2
Model Selection

2.1 Model Selection Summary

A summary of the AERMOD and pre-processor versions that will be used for the project is identified in Table 2-1. These or newer versions as they are adopted by the United States Environmental Protection Agency (USEPA) will be used to demonstrate compliance with ambient concentration limits.

Table 2-1. AERMOD and Pre-Processor Module Versions

Model/Module	Version
AERMOD	AERMOD version 21112 will be used for the dispersion modeling analysis. MRS uses the Breeze AERMOD View software as a front end user interface for AERMOD and requests permission to use the Breeze parallel version of AERMOD (AERMOD Breeze, version 21112).
AERMAP	Elevations will be assigned to receptors using AERMAP version 18081 and data from the 1/3 arc-second National Elevation Dataset (NED). Elevations for the buildings and sources will be set to the proposed grade elevation.
AERMET	Not applicable. MRS is requesting the use of representative pre-processed meteorological data provided by KDAQ.
AERSURFACE	Not applicable. MRS is requesting the use of representative pre-processed meteorological data provided by KDAQ.
AERMINUTE	Not applicable. MRS is requesting the use of representative pre-processed meteorological data provided by KDAQ.
BPIP	Downwash parameters will be assigned to point sources using BPIP version 04274. All building heights and locations will be provided in the PSD application.

2.2 Model Selection

The U.S. EPA American Meteorological Society / Environmental Protection Agency Regulatory Model (AERMOD) model includes a state-of-the-science downwash algorithm and utilizes AERMET, a meteorological data preprocessor that utilizes current planetary boundary layer theory to calculate dispersion coefficients. The most current version of the AERMOD model (version 21112) will be used in conducting the modeling analysis.

The modeling will be performed using the regulatory default option, which includes:

- Stack-tip downwash; and
- A routine for processing averages when calm wind conditions occur or when meteorological data is missing

2.3 Meteorological Data

EPA modeling guidance allows the use of five years of off-site meteorological data or at least one year of on-site meteorological data. FW is requesting the use of representative meteorological data pre-processed by KDAQ and made available through KDAQ's website (Bowling Green data is applicable for Simpson County). The data is currently available for years 2015 through 2019.

2.4 Building Wake Effects

The emission sources considered in this analysis will be evaluated in terms of their proximity to nearby structures. The purpose of this evaluation is to determine if stack discharge might become caught in the turbulent wakes of these structures. Wind blowing around a building creates zones of turbulence that are greater than if the building was absent. Plumes entrained in the zones of turbulence experience enhanced plume growth and restricted plume rise. AERMOD incorporates the Plume Rise Model Enhancements (PRIME) algorithms using dimensions from the EPA's Building Profile Input Program (BPIP) for estimating for plumes affected by building wakes. The site layout will be used to digitize buildings and structures to be included in the downwash analysis.

Direction-specific building dimensions and the dominant downwash structure parameters will be determined using the BREEZE® BPIP software. This software incorporates the algorithms of the U.S. EPA-sanctioned Building Profile Input Program with PRIME enhancement (BPIP-PRIME).

2.5 Model Terrain

The terrain elevation for each modeled receptor, building, and source will be determined using the USGS National Elevation Dataset (NED).

The terrain height for each modeled receptor will be calculated using the AERMOD terrain processor (AERMAP version 18081). In addition to terrain elevation, an additional parameter called the hill height scale is required for each receptor to execute AERMOD's terrain modeling algorithms. AERMOD computes the impact at a receptor as a weighted interpolation between horizontal and terrain-following states using a critical dividing streamline approach. This scheme assumes that part of the plume mass will have enough energy to ascend and traverse over a terrain feature and the remainder will impinge and traverse around a terrain feature under certain meteorological conditions. The hill height scale will be computed by the AERMAP terrain preprocessor for each receptor as a measure of the one terrain feature in the modeling domain that would have the greatest effect on plume behavior at that receptor.

The hill height scale does not represent the critical dividing streamline height itself, but supplies the computational algorithms with an indication of the relative relief within the modeling domain for the determination of the critical dividing streamline height for each hour of meteorological data.

According to Section 2.2.1 of the AERMOD Users Guide, the NED array boundary for AERMAP must include all terrain features that exceed a 10 percent elevation slope from any given receptor to properly calculate the hill height scale at each receptor. The domain for the hill height analysis will be set to the minimum coverage required for proper handling of elevation slope (an automated feature within the Breeze AERMOD software).

2.6 Urban/Rural Determination

As with the initial construction modeling, the facility remains located in a predominantly rural area. Therefore, rural settings will be selected in AERMOD.

2.7 Receptors

The same Cartesian receptor grid spacing [using UTM WGS84 coordinate system] in the i**nitial construction demonstration** will be used for the SMC and SIA model runs including:

- receptors spaced at 100 meter intervals along the fenceline;
- receptors spaced at 100-meter intervals extending approximately 4 km from the center of the facility.
- Receptors spaced at 500 meter extending from 4 km to 10 km from the center of the facility;
- If necessary, receptors spaced 1,000 meters extruding from 10 km to 50 km from the center of the facility.

The results of the SIA modeling, demonstrating the extents of the Significant Impact Area, will determine the size of the Cartesian receptor grid (with 100-meter spacing) surrounding the facility to be used for PSD Increment and NAAQS modeling analyses. Locations of off-site background sources and Class I Area(s) will determine the locations of additional receptors.

2.8 Non-Default Options

FW is not requesting the use of any non-regulatory default options in AERMOD.

Section 3
Modeling Methodology

3.1 Introduction

For pollutants that exceed PSD significant emission levels, the modeling analysis is performed in the following two step process:

Step 1 – A significant impact analysis, and if required;
Step 2 – A full impact analysis.

3.2 Significant Impact Analysis

In the Significant Impact Analysis, only project sources will be modeled to determine if the proposed emission changes have a significant impact on the surrounding areas. The maximum modeled concentrations from the significant impact analysis will be compared to the applicable significant impact levels (SILs), for each pollutant and averaging period. If the maximum modeled concentration is less than the SIL, no further analysis is required to demonstrate compliance with the NAAQS or PSD Increment. If the maximum modeled concentration exceeds the applicable SIL, a full impact analysis will be completed. Based on the prior application modeling results, it is anticipated that a full impact analysis will be required for PM_{10} and $PM_{2.5}$ emissions.

Table 3-1 summarizes the applicable SILs for each pollutant that will be modeled and identifies the AERMOD output option that will be used to evaluate each pollutant's SIL.

3.3 Significant Impact Area

Assuming at least one pollutant exceeds the SIL, the Significant Impact Analysis conducted above establishes the Significant Impact Area (SIA). The project's SIA is determined as the geographical area that the required air quality analyses for NAAQS and PSD increment air dispersion modeling will be conducted.

This area is defined to include all locations where the modeled potential emissions from the new sources are determined to be above the SIL, and for modeling purposes is treated as a radius around the facility to the most distant receptor exceeding the SIL, as a worst-case (largest) SIA for all pollutants and averaging periods, and described further as follows:

- For NAAQS with annual or 24-hour averages, the SIA is defined as the circular area from the radius from the source to either the most distant point where the model estimates a SIL will be exceeded or 50 kilometers, whichever is less. As discussed below, sources outside the SIA but inside the 50 kilometers will be screened using a 20D approach to determine if their impact is significant to the project.
- For NAAQS with shorter duration, such as for CO (which is not expected to exceed the SIL), a SIA will be similar to the above but not shorter than 10 kilometers.

The SIA is used for the full Impact analysis (both NAAQS and PSD increment) as well as a guide to identify other sources and facilities that will be included in the air dispersion modeling. Because compliance with the previous Air Permit has not been completely demonstrated and considering the limited emission increase identified in Section 1. The states of Kentucky and Tennessee will be contacted to identify off-site sources that should be evaluated as part of the modeling analysis.

3.4 Full Impact Analysis

For pollutants with maximum modeled concentration that exceed the applicable SIL, a full impact analysis will be completed. The full impact analysis considers post-project "facility-wide" emissions including non-project emission sources. A full impact analysis will be conducted for the significant impact area (SIA) as defined as a radius around the facility to the most distant receptor exceeding the SIL for each pollutant and averaging period, as discussed above.

Given the previous air dispersion modeling, it is anticipated a full impact analysis will be required for PM_{10} and $PM_{2.5}$ and the analysis is outlined below. Should a full impact analysis be required for CO, a similar approach will be used.

3.4.1 PM_{10} and $PM_{2.5}$ NAAQS Modeling Inventory

For PM_{10} and $PM_{2.5}$, the NAAQS demonstration will consider facility-wide emissions as well as off-site emissions. As discussed, the off-site PM_{10} and $PM_{2.5}$ emissions will consider permitted major sources within the SIA as identified in the original permit application.

Permitted sources located outside the SIA and within the annular area extending 50 km from the source will also be included if they have a potential to affect air quality near the source. This determination was made in the original application by using the '20D' approach, to eliminate the majority of regional facilities from the PSD NAAQS modeling analysis that would not be expected to have a significant impact on analysis results. Under this approach, an off-site source is excluded if its potential allowable emissions (Q) in tons/yr is less than 20 times the distance in kilometers ("20D") between it and the facility.

NAAQS values and AERMOD output options for determining compliance are provided in Table 3-1.

3.4.2 PM_{10} and $PM_{2.5}$ Increment Inventory

The increment inventory to be considered in the modeling analysis will include all increment-affecting sources located within the SIA of the facility.

The "baseline concentration" is the existing concentration at the time of the first "complete" application submittal in an area. The emissions that start after that date add to the consumption of the increment.

Table 3-1. Applicable Modeling Levels, Concentrations, Standards and PSD Increments

Pollutant	Averaging Period	Significant Monitoring Concentration[a] (µg/m^3)	AERMOD SMC Output Option	Class I SIL[e] (µg/m^3)	Class II SIL[e,g] (µg/m^3)	AERMOD SIL Output Option	Primary NAAQS (µg/m3)	AERMOD NAAQS Output Option	PSD Class I Increment[f] (µg/m^3)	PSD Class II Increment[f] (µg/m^3)	AERMOD PSD Increment Output Option
PM_{10}	24-hour	10	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	-	5	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	150	H6H for all 5-years (together), 1 run (5 years), Single highest	8	30	H2H for each 1-year, 5 separate runs (years), Maximum of
	Annual	NA	NA	-	1	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	Revoked[c]	-	4	17	H1H for all 5-years (together), 1 run (5 years),
$PM_{2.5}$	24-hour	4[d]	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	0.07	1.2	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	35	H8H for each 1-year, 5 separate runs (years), Average	2	9	H2H for each 1-year, 5 separate runs (years), Maximum of
	Annual	NA	NA	0.06	0.3	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	12	H1H for each 1-year, 5 separate runs (years), Average	1	4	H1H for all 5-years (together), 1 run (5 years),
CO[f]	1-hour	NA	NA	-	2000	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	40000 (35 ppm)	H2H for each 1-year, 5 separate runs (years), Maximum of	-	-	-
	8-hour	575	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	-	500	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	10000 (9 ppm)	H2H for each 1-year, 5 separate runs (years), Maximum of	-	-	-

[a]401 KAR 51:017 Section 7(5)(a) and 40 CFR 52.21(i)(5)(i). See footnote d

[b]NTBE=Not to be exceeded

[c]Primary and secondary annual PM10 NAAQS of 50 µg/m3 was revoked effective 12/18/2006 [71 FR 6114].

[d]$PM_{2.5}$ SMC determined not authorized by CAA (court decision June 23, 2016), but EPA retains the argument that value can be used as part of an overall monitoring assessment

[e]401 KAR 51:017 Section 9(2). See footnote g.

[f]401 KAR 51:017 Section 2(1)

[g]USEPA document "Guidance on SIL for Ozone and Fine Particles in PSD Permitting Program" (4/17/2018) identifies annual $PM_{2.5}$ Class II SIL value of 0.2 µg/m^3

The types of stationary point sources within the SIA that would be reviewed to determine the need to include them in the increment inventory fall under two specific time frames identified below:

Major Source Baseline Date
The "major source baseline date" is defined by statute or implementing regulation. The "major source baseline dates" are January 6, 1975 and October 10, 2010, for PM_{10} and $PM_{2.5}$, respectively. After the "major source baseline date" the following sources will be reviewed to determine the need to including them in the increment inventory:

- New major stationary sources, including the original applicant; and
- Existing major stationary sources undergoing modifications.

At the time of submittal of the previous application no major sources were identified in the SIA.

Minor Source Baseline Date
The "trigger date" is the date established by EPA, after which the minor source baseline date may be established. The "trigger dates" are August 7, 1977 and October 20, 2011 for PM_{10} and $PM_{2.5}$, respectively. Following the trigger date, the "minor source baseline date" is established after which a "complete" PSD application starts the counting of changes in minor source emissions. EPA has assumed the "minor source baseline date" is equivalent to the "trigger date." Therefore, since the "minor source baseline date" has passed, after submittal of the initial "complete" PSD permit application, the following sources will be reviewed to determine the need to including them in the increment inventory:

- Existing stationary sources having undergone a physical change or change in their method of operation; as well as
- Existing stationary sources having increased hours of operation or capacity utilization (unless such change was considered representative of baseline operating conditions).

As no other "complete" PSD permit application had been submitted prior to the initial FW permit application, providing this application is revising the previous application, and the fact the facility has not demonstrated initial compliance with PM_{10} and $PM_{2.5}$ emission limits contained in the subsequently issued Air Permit, the requirement to include sources beyond the "minor source baseline date" is not yet applicable.

PSD Class II Increment values and the AERMOD output option for determining compliance with those values are identified in Table 3-1.

3.5 Pre-Construction Monitoring Analysis

As part of a PSD modeling analysis, a pre-construction monitoring analysis must be performed to determine whether preconstruction monitoring may be required to evaluate existing air quality before the permit is issued. The U.S. EPA's Significant Monitoring Concentrations (SMC) establish the levels at which a facility may need to conduct pre-construction ambient air quality monitoring for pollutants subject to PSD review in order to evaluate the existing air quality.

Note that since the emission increases exceed PSD thresholds for PM_{10} and $PM_{2.5}$ [CO is likely excluded as a result of concentrations less than the respective SIL], a pre-construction monitoring analysis will only be conducted for these pollutants.

Table 1 provides the and AERMOD output options that will be used to assess whether the SMCs values are exceeded. FW will compare the applicable pollutant-averaging period maximum model concentration result from the significant impact analysis to these SMCs. If the SMCs are not exceeded, then no pre-construction monitoring could be required.

Similar to the previous application, it is anticipated that the maximum modeled PM_{10} and $PM_{2.5}$ concentrations will exceed the SMC.

3.6 Background Concentrations

A "representative" background concentration is required for each modeled pollutant and averaging period to complete the NAAQS modeling analysis. In this modeling analysis it is anticipated that only NAAQS modeling for 24-hour PM_{10} and both 24-hour and annual $PM_{2.5}$ averaging periods will be required.

The background concentration accounts for sources of air pollution other than those explicitly modeled (i.e., the facility and the industrial neighbors identified to represent the nearby inventory sources). Typically, background concentrations are accounted for by using air quality data measured at an appropriate monitoring station.

In the 2017 permit application, FW used the background PM_{10} concentration from the Nashville Monitor (AQS ID: 47-037-0024) active 2000 through 2016 located at 56th Avenue and Louisiana Streets in Nashville, TN and the $PM_{2.5}$ concentration from the Bowling Green Monitor/Smiths Grove (AQS ID: 21-227-0009) located at 226 Sunset Street Smiths Grove, Kentucky. Background concentrations are shown in Tables 3-2 and 3-3 below.

Table 3-2. PM10 Background Concentrations - Nashville, TN Monitor (AQS ID: 47-037-0024)

Year	Second High 24-Hour Concentration (µg/m3)
2014	38
2015	41
2016	33
Average	**37**

Table 3-3. PM2.5 Background Concentration - Bowling Green, KY Monitor (AQS ID: 21-227-0009)

Year	Averaging Period	
	Annual ($\mu g/m^3$)	24-Hour ($\mu g/m^3$)
2014	9.10	20.0
2015	8.40	18.0
2016	8.10	15.5
Average	**8.53**	**17.8**

If the maximum modeled PM_{10} and $PM_{2.5}$ concentrations exceeds the SMC, as with the prior application, given the above PM_{10} Nashville Monitor (AQS ID: 47-037-0024) is no longer active, FW proposes to use the Nashville Monitor (AQS ID: 47-037-0023) located at 105 South 17th Street in Nashville, TN. Sufficient annual data is available for years 2018-2020.

Below provides the 1st through 4th maximum PM_{10} 24-hour averages for calendar years 2018-2020 at the above Nashville Monitor AQS ID: 47-037-0023.

CY2018: 55 $\mu g/m^3$; 41 $\mu g/m^3$; 32 $\mu g/m^3$; 32 $\mu g/m^3$
CY2019: 33 $\mu g/m^3$; 32 $\mu g/m^3$; 29 $\mu g/m^3$; 29 $\mu g/m^3$
CY2020: 63 $\mu g/m^3$; 58 $\mu g/m^3$; 42 $\mu g/m^3$; 41 $\mu g/m^3$

The above provides an average second high 24-hour concentration of 43.6 $\mu g/m^3$.

As with the previous application, FW proposes continued use of the Bowling Green Monitor/Smiths Grove (AQS ID: 21-227-0009) located at 226 Sunset Street Smiths Grove, Kentucky for $PM_{2.5}$ 24-hour and annual averaging periods.

The above Bowling Green/Smiths Grove monitoring location provides the following background $PM_{2.5}$ values:

- 24-hour average $PM_{2.5}$ concentration using the average of the 98th percentile values over the three year period of 2018-2020 of 16.59 µg/m3 (17.36, 16.41, 16.00)
- Annual average $PM_{2.5}$ concentration using the average concentrations over the three year period of 2018-2020 is 7.76 ug/m3 (7.97, 7.57, 7.75).

3.7 Class I Area Impact Assessment

The current Federal Land Manager (FLM) policies, as outlined in the FLAG document (2010 Federal Land Air Guidance) state that any Class I areas within 300 km of the proposed source as well as any other Class I areas that may be potentially affected should be identified and evaluated for potential air quality impacts on those Class I areas.

Class I areas are federally protected areas for which more stringent air quality standards apply. “Class I” areas are generally defined as federal lands such as national parks (NP), national wilderness areas, and national monuments. There are five (5) Class I areas within 300 km of the facility location.

Typically, Class I area assessments are conducted in the following two ways: PSD increment consumption and AQRV (typically visibility and deposition).

A list of these Class I areas and their approximate distance from the facility is provided in Table 3-4.

Table 3-4. Distance to Class I Areas within 300 km of Fritz Winter

Site/Class I Area	UTM Cooridnates		Shortest Distance to Fritz Winter (km)
	East (km)	North (km)	
Fritz Winter	539.82	4072.44	-
Mammoth Cave National Park	574.61	4109.48	51
Great Smoky Mountains National Park	774.92	3943.98	268
Joyce Kimer-Slickrock Wilderness	771.57	3928.7	273
Sipsey Wilderness	467.42	3798.71	283
Cohutta Wilderness	716.4	3874.22	265

3.7.1 Class I Area AQRV PSD Analysis

The Federal Land Managers (FLM) have the authority to protect Air Quality Related Values (AQRVs), and to consider in consultation with the permitting authority whether a proposed major source or modification will have an adverse impact on such values. AQRVs for which PSD modeling evaluations is typically conducted include visibility and deposition of sulfur and nitrogen.

Historically, Class I Area AQRV analyses were developed based on the distance between a PSD project and a Class I Area. The distance threshold has been 300+ km depending on the magnitude of emissions for a project and regulatory agency discretion.

In October 2010, The Federal Land Managers Air Quality Related Values (AQRV) Workgroup (FLAG) Phase I Report – Revised (2010) was issued providing guidance which established a threshold ratio of emissions to distance, which AQRV review is not required. Specifically, if the sum of SO_2, NO_x, PM_{10} and H_2SO_4 emissions (Q, in tpy) divided by distance (d, in km) is less than 10, no AQRV analysis is required.

Based upon the distance to the nearest Class I area to the project, as with the previous applications, FW proposes to use the Q/D screening criteria in the Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report to demonstrate that the project will have no significant impacts on any Class I air quality related value (AQRV), including visibility.

Similar to the initial project it is assumed that no value will exceed 10 and the facility will not be subject to AQRV review.

3.7.2 Class I Area PSD Increment Analysis

Provided all the Class I areas are located more than 50 km from the facility the following approach will be used:

AERMOD will be used to determine concentrations at the boundary of the model by placing receptors as follows for each of the six (6) Class I Areas identified in Table 3 4: in 3 rows of arcs, at 48 km, 49 km, and 50 km from the facility, with each arc spanning 10 degrees of the circumference (5 degrees each direction from the straight line between the site and the Class I Area), with spacing of 100 meters between receptors in each arc.

Given the results of the previous permit application presented in Table 3-5 below, it is anticipated that concentrations will be less than the Class I Area SILs.

Provided the concentrations are less than the Class I Area SILs at 50 km, it is assumed that concentrations at distances beyond 50 km will continue to decrease. Based on this review it would be determined that no Class I areas will be negatively impacted per Section 4.2 of the Guideline on Air Quality Models.[1]

Table 3-5. Class I Maximum Impact Comparted to Class I SIL (2016 Application)

Pollutant	Averaging Period	Significant Impact Level µg/m^3	Class I Area Maximum Impact in µg/m^3				
			Mammoth Cave	Great Smokey Mountains	Joyce Kilmer-Slickrock	Cohutta	Sipsey
$PM_{2.5}$	Annual	0.06	0.00516	0.000116	0.0000935	0.000125	0.0000884
	24 hr	0.07	0.0606	0.00246	0.00179	0.00258	0.00206
PM_{10}	Annual	0.16	0.00625	0.0000568	0.0000471	0.0000603	0.0000464
	24 hr	0.32	0.0951	0.00216	0.00174	0.00161	0.00173

3.7.3 Modeling for Visibility

Similar to Section 3.7.1, the protocol proposes to use the Q/D screening criteria in the Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report to demonstrate that the project will have no significant impacts on visibility.

3.8 Modeled Emission Rates for Precursors (MERPs)

On August 2, 2018 Kentucky Division for Air Quality released a document entitled "Application of the EPA's Modeled Emission Rates for Precursors (MERPS) for Secondary Pollutant Formation in Kentucky." Following release of this document, on April 30, 2019 USEPA issued an update to their guidance entitled "Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program."

The Kentucky DAQ guidance document will be followed for the evaluation of both $PM_{2.5}$ and ozone as required. The Table 3 Default MERP values for Kentucky PSD Applications will be used.

[1] USEPA, Guideline on Air Quality Models, 40 CFR, Part 51, Appendix W, FR, Vol. 82, No. 19, Section 4.2

3.8.1 Secondary Formation of $PM_{2.5}$

The Kentucky DAQ document entitled "Application of the EPA's Modeled Emission Rates for Precursors (MERPS) for Secondary Pollutant Formation in Kentucky" presents a multitiered screening analysis based on facility wide emission rates of NO_x, SO_2 and $PM_{2.5}$ emissions.

It is anticipated that a cumulative analysis will be required for $PM_{2.5}$. As stated above, the current project direction is to use the Table 3 Default MERP Values when conducting the cumulative analysis.

3.8.2 Secondary Formation of Ozone

Potential emissions of NO_2 are below the significant emission rate of 40 tpy; however, potential VOC emissions from the project will be above the significant emission rate of 40 tpy. VOC is considered a precursor for secondary formation of ground-level (tropospheric) ozone. Therefore, an assessment of the potential impact on ambient ozone air quality in the area is required.

For ozone the tiered approach will again be used. Given the facility's emission rate of NO_x and VOC, a cumulative analysis will likely be unnecessary.

Simpson County is currently designated as attainment for ozone. Simpson and the surrounding counties are rural with relatively few industrial sources and have low background concentrations of ozone as compared to other areas of the state. Given that secondary formation of ozone is more of a long-range transport issue, precursor VOC emissions from the project are not expected to have significant impacts to ambient air quality or to cause or significantly contribute to a violation of the ozone NAAQS.

3.9 Air Toxics

The project includes emissions of certain compounds that may be identified as "potentially hazardous matter or toxic substances." To demonstrate FW will comply with 401 KAR 63:020 that regulates potential hazardous matter or toxics substances (i.e., toxic air pollutants – TAPs) and in order to evaluate whether these toxic compounds are in sufficient concentration that they could present a health hazard, air dispersion modeling will be conducted.

The same meteorological data and stack conditions described elsewhere will be used to determine maximum annual ground level concentrations of each TAP. The maximum concentration of all the receptors will be compared to the concentrations listed as having a significant health threat in EPA Region IX "Regional Screening Level (RSL) Resident Ambient Air Table (TR=1E-6, HQ=1) June 2015". The concentrations in that table were derived for chemical exposures around waste storage sites and are considered very conservative.

3.10 Additional Impact Analysis

The results of the air dispersion modeling analysis will be used in the project's additional impact analyses to assist in assessing impacts related to growth, adverse effects on soil & vegetation, and visibility impairment.

Section 4
Emission and Stack Characterization

4.1 Emissions Modeled

In the modeling analysis for the NAAQS and PSD increment demonstrations, the worst-case emissions for site-wide sources will be modeled. Potential hourly emission rates will be used to develop 24-hour and annual emission rates.

4.2 Stack Parameters

Table 4-1 contains a summary of the facility stack parameters that will be modeled. The facility does not operate any other emission sources. The emission sources will be modeled as point sources with the identified Stack Parameters.

Table 4-1. Modeled Emission Sources and Stack Parameters

Stack ID	X Coord (m)	Y Coord (m)	Stack Height		Stack Diameter		Stack Temperature		Stack Velocity		Air Volume (cfm)	Stack Orientation
			(m)	(ft)	(m)	(ft)	(°K)	(°F)	(m/s)	(fps)		
ST02	539906	4072425	35	114.8	2.54	8.33	305	90	14.9	48.9	160000	V
ST03	539903	4072413	17	55.8	0.30	1.00	294	70	3.9	12.7	600	H
ST04	539904	4072404	22	72.2	0.30	1.00	294	70	3.9	12.7	600	H
ST05	539906	4072407	22	72.2	0.30	1.00	294	70	3.9	12.7	600	H
ST06	539908	4072411	22	72.2	0.30	1.00	294	70	3.9	12.7	600	H
ST07	539888	4072396	40	131.2	2.03	6.67	300	80	15.3	50.1	105000	V
ST08	539822	4072517	26	85.3	0.97	3.17	294	70	9.7	31.7	15000	V
ST09	539816	4072488	43	141.1	1.97	6.46	305	90	17.8	58.5	115000	V
ST11	539901	4072410	17	55.8	0.30	1.00	294	70	3.9	12.7	600	H
ST12	539832	4072331	30	98.4	1.52	5.00	286	55	16.8	55.2	65000	V
ST13	539899	4072407	17	55.8	0.30	1.00	294	70	3.9	12.7	600	H
ST15A	539708	4072441	14.2	46.6	0.41	1.33	301	82	10.1	33.0	2750	VO
ST15B	539704	4072435	14.2	46.6	0.41	1.33	301	82	10.0	32.8	2750	VO
ST16	539698	4072424	14.2	46.6	0.98	3.22	297	75	12.7	41.7	20310	V

Appendix O
Pre-Construction Monitoring Waiver

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madriverstrategies.com

mad river strategies llc

October 7, 2021

Melissa Duff
Director, Division for Air Quality
Kentucky Department for Environmental Protection
300 Sower Boulevard
2nd Floor
Frankfort, KY 40601

Subject: Pre-construction Ambient Air Monitoring Waiver Request
Fritz Winter North America, LP (Agency Interest No. 129745)
Franklin, Kentucky

Dear Ms. Duff;

Fritz Winter North America, LP (FWNA) will be submitting a revised air permit application to facilitate changes to the existing PSD/Title V Air Quality Permit V-16-022-R1 (Air Permit) issued on November 25, 2017 for the operation located at 1 Fritz Winter Way in Franklin (Simpson County), Kentucky.

Consistent with the previous permit applications submitted in 2016 and 2017, this correspondence requests a waiver of the 40 CFR 52.21(m) requirement to conduct pre-construction site-specific monitoring of ambient air for the purpose of establishing background concentrations for the permit application required air quality impact analysis. As an alternative, and as provided for in 40 CFR 51, Appendix W, FWNA is requesting the use of existing regional data providing the available data meets the requirements identified in 40 CFR 51, Appendix W, 8.3.1 and 8.3.2. As requested by your staff, the revised air permit application will provide necessary information to support the selected monitors providing ambient air concentrations meet the requirements of 40 CFR 51, Appendix W, 8.3.1 and 8.3.2.

Background

As authorized by the Air Permit, Fritz Winter North America LP (FW) constructed and operates a gray iron foundry and machining operation to produce automotive parts, predominantly brake rotors. The facility is located in the Wilkey North Industrial Park located in Franklin, Simpson County, Kentucky. The facility is located approximately 5 miles north of Franklin and 13 miles south of BowlingGreen along State Route 31W.

As a result of Air Permit required initial performance testing, it was determined that certain established emission limitations were not met. Given the results of the performance test, a revised permit application is being prepared.

While the application is not yet complete, a comparison of the likely project emissions is presented in Table 1-1 below. The largest Table 1-1 increase is a result of revisions made to the Coremaking volatile

organic compound (VOC) emission rates. The table also show a reduction in PM and PM_{10} potential emission rates and an increase in carbon monoxide (CO) emissions.

Table 1-1. Emission Increase Comparison (2017 versus 2021)

Pollutant	PSD SER (tpy)	2017 Permit Modification		2021 Permit Revision	
		Emissions Increase (tpy)	PSD Permitting Required? (Yes/No)	Emissions Increase (tpy)	PSD Permitting Required? (Yes/No)
Filterable PM	25	43.3	Yes	34.28	Yes
PM_{10}	15	47.3	Yes	34.28	Yes
$PM_{2.5}$	10	30.9	Yes	34.28	Yes
SO_2	40	1.49	No	1.04	No
NO_x	40	28.5	No	18.04	No
VOC	40	79.1	No	112.27	Yes
CO	100	297	Yes	312.39	Yes
Lead	0.6	0.28	No	0.02	No

Similar to the initial application, due to the emission rates of CO and possibly VOC emissions exceeding 100 tpy, PSD permitting requirement will be applicable to PM_{10}, $PM_{2.5}$, VOC, and CO. While we continue to finalize the emission increase, it is possible that VOC emissions from this application will decrease to below 100 tpy.

Table 1-2 compares the expected revised emission rates and BACT to the same values provided in the current Air Permit. The table shows a decrease in potential emissions of PM and PM_{10} and an increase in $PM_{2.5}$ emissions.

Table 1-2. Preliminary PM BACT Comparison (2017 versus 2021)

Control Device (Stack)	CURRENT PERMIT (2017)			PROPOSED LIMITS (2021)		
	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02)	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0006 gr/dscf 0.850 lb/hr 3.72 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr
CU06 (ST07)	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0015 gr/dscf 1.30 lb/hr 5.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr
CU08 (ST09)	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0015 gr/dscf 2.12 lb/hr 9.30 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr	0.002 gr/dscf 1.90 lb/hr 8.32 ton/yr
CU11 (ST12)	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0015 gr/dscf 0.792 lb/hr 3.47 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr
	Increase over Current Permit (2017) in tpy:			**-4.86**	**-4.86**	**9.92**

Table 1-3 compares the expected revised emissions rates and BACT for VOC and CO to the same values provided in the Air Permit. The table shows an overall potential increase in VOC and CO of 37.56 and 22.61 tpy, respectively for these stacks.

Table 1-3. Preliminary VOC and CO BACT Comparison (2017 versus 2021)

Stack or Vent	CURRENT PERMIT (2017)		PROPOSED LIMITS (2021)	
	BACT for VOC	BACT for CO	BACT for VOC	BACT for CO
CU01 ST02	0.14 lb/hr; 0.61 ton/yr	2.11 lb/hr; 9.25 ton/yr	3.85 lb/hr; 4.85 ton/yr	2.11 lb/hr; 31.85 ton/yr
CU06 ST07 (Previously EU53)	0.10 lb/ton gray iron; 4.58 ton/yr	1.00 lb/ton gray iron; 25.3 lb/hr	0.528 lb/ton gray iron; 13.39 lb/hr 24.18 ton/yr	1.00 lb/ton gray iron; 25.30 lb/hr 45.79 ton/yr
CU07 ST08	0.70 lb/hr; 1.67 ton/yr	N/A	17.35 lb/hr; 31.38 ton/yr	N/A
CU08 ST09	20.8 lb/hr; 39.7 ton/yr	128 lb/hr; 235 ton/yr	12.98 lb/hr; 23.71 ton/yr	128 lb/hr; 234.74 ton/yr
	Increase over Current Permit (2017) in tpy:		**37.56**	**22.61**

SILs and SMCs

Generally, when conducting the preliminary analysis during the air quality impacts phase of the project, if modeled emission rates are below the significant impact levels (SILs), no further modeling is required. As with the previous permit applications, maximum concentrations of CO will be less than both the 8-hour and 1-hour SILs, therefore background concentrations of CO will be unnecessary for the project.

Significant Monitoring Concentrations (SMCs) are levels if not exceeded additional monitoring may not be necessary. Though emission calculations are being finalized it is possible that PM_{10} 24-hour concentrations will be less than the 10 $\mu g/m^3$ SMC value. Should this continue to be the result, establishing background concentrations of PM_{10} would also be unnecessary.

PM2.5 is expected to exceed the applicable SIL and the 24-hour SMC[1]

Request

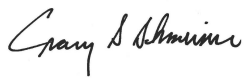
Similar to the previous applications as well as a large majority of PSD permit applications that are prepared and submitted, FWNA is requesting the use of federal and/or state-collected air quality monitoring data to establish "background" concentrations for use in conducting the air quality impact

[1] PM2.5 SMC determined not authorized by CAA (Court decision June 23, 2016), but EPA retains the argument that value can be used as part of an overall monitoring assessment.

analysis portion of the revised air permit application and correspondingly a waiver of the pre-construction ambient air monitoring requirements.

Should you have any questions regarding this request, please contact me at craig.schmeisser@madriverstrategies or 614.425.6392 or Eddie Butler at eddie.butler@fritzwinter.us.

Respectfully submitted,



Craig S. Schmeisser
Senior Project Consultant

Copy to: Eddie Butler – Fritz Winter North America, LP (via email)
Kevin Davis – Kentucky DEP, DAQ (via email)
Rick Shewekah – Kentucky DEP, DAQ (via email)
Amy Tempus-Doom – Kentucky DEP, DAQ (via email)

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November 3, 2021

Mr. Butler, EHS Manager
Fritz Winter North America, LP
1 Fritz Winter Drive
Franklin, Kentucky 42134

Re: Pre-construction Monitoring Waiver

Dear Mr. Butler,

The Kentucky Division for Air Quality (Division) has received and reviewed the request for a pre-construction monitoring waiver submitted within the letter dated October 7, 2021, by Mad River Strategies LLC on behalf of Fritz Winter North America, LP (Fritz Winter).

As stated in the protocol, Fritz Winter is aware that the U.S. Environmental Protection Agency requires onsite pre-construction monitoring pursuant to 40 CFR 52.21(m)(a)(iii-iv). However, section 8.2.2.c. of Appendix W to 40 CFR 51 (Guidance) states:

If there are no monitors located in the vicinity of the source, a "regional site" may be used to determine background. A "regional site" is one that is located away from the area of interest but is impacted by similar natural and distant man-made sources.

The letter submitted on October 7, 2021, identified Fritz Winter's desire to utilize air quality monitors that best represent background concentrations for PM, PM_{10}, $PM_{2.5}$, VOC and CO at the Fritz Winter North America, LP site. At this time, the Division grants the request to waive pre-construction monitoring for the Fritz Winter North America, LP project. Fritz Winter will be responsible for providing sufficient justification for the representative monitors chosen according to 401 KAR 51:017 and 40 CFR 51, Appendix W in the anticipated permitting application.

If you have any questions, please contact Amy Tempus-Doom, Metallurgy Section Supervisor, at (502) 782-6786 or Amy.Tempus-Doom@ky.gov.

Sincerely,

Rick Shewekah

For: Melissa Duff, Director
Kentucky Division for Air Quality

EJA/akt

Appendix P
Off-Site Sources

Appendix P – Workbooks showing reduction of off-site sources to be submitted separately.

Appendix Q
VISCREEN Results

Visual Effects Screening Analysis for
Source: Fritz Winter North Ameri
Class I Area: Mammoth Cave National Pa

*** Level-1 Screening ***

Input Emissions for

Particulates	33.91	TON/YR
NOx (as NO2)	18.04	TON/YR
Primary NO2	0.00	TON/YR
Soot	0.00	TON/YR
Primary SO4	0.00	TON/YR

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	0.04 ppm
Background Visual Range:	25.00 km
Source-Observer Distance:	51.00 km
Min. Source-Class I Distance:	51.00 km
Max. Source-Class I Distance:	62.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	84.	51.0	84.	2.00	0.058	0.05	0.001
SKY	140.	84.	51.0	84.	2.00	0.008	0.05	0.000
TERRAIN	10.	84.	51.0	84.	2.00	0.020	0.05	0.000
TERRAIN	140.	84.	51.0	84.	2.00	0.005	0.05	0.000

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume

SKY	10.	45.	43.4	124.	2.00	0.065	0.05	0.001
SKY	140.	45.	43.4	124.	2.00	0.008	0.05	0.000
TERRAIN	10.	55.	45.6	114.	2.00	0.027	0.05	0.000
TERRAIN	140.	55.	45.6	114.	2.00	0.006	0.05	0.000

Appendix R
KDAQ Permit Application Forms

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601
(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information
___ Section AI.2: Applicant Information
___ Section AI.3: Owner Information
___ Section AI.4: Type of Application
___ Section AI.5: Other Required Information
___ Section AI.6: Signature Block
___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

___ Additional Documentation attached

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 11/30/2021

Section AI.1: Source Information

Physical Location Address:	**Street:**	1 Fritz Winter Drive				
	City:	Franklin	**County:**	Simpson	**Zip Code:**	42134
Mailing Address:	**Street or P.O. Box:**	1 Fritz Winter Drive				
	City:	Franklin	**State:**	KY	**Zip Code:**	42134

Standard Coordinates for Source Physical Location

Longitude: 36.79749 (decimal degrees) **Latitude:** -86.554991 (decimal degrees)

Primary (NAICS) Category: Motor Vehicle Brake System Mfg. **Primary NAICS #:** 336340

Classification (SIC) Category: Motor Vehicle Parts and Accessories **Primary SIC #:** 3714

Briefly discuss the type of business conducted at this site: The casting and machining of iron parts for the automotive industry.

Description of Area Surrounding Source: ☐ Rural Area ☑ Industrial Park ☐ Residential Area ☐ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employees: 300

Approximate distance to nearest residence or commercial property: *0.4 miles*

Property Area:

Is this source portable? ☐ Yes ☑ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☑ Currently Hold	☐ Need	☐ N/A
RCRA:	☑ Currently Hold	☐ Need	☐ N/A
UST:	☐ Currently Hold	☐ Need	☑ N/A

Type of Regulated Waste Activity: ☐ Mixed Waste Generator ☑ Generator ☐ Recycler ☐ Other: _____ ☐ U.S. Importer of Hazardous Waste ☐ Transporter ☐ Treatment/Storage/Disposal Facility ☐ N/A

Section AI.2: Applicant Information

Applicant Name: Fritz Winter North America, LP

Title: (if individual)

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** KY **Zip Code:** 42134

Email: (if individual)

Phone: (270) 813-4000

Technical Contact

Name: Hauke May

Title: Project Manager

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** Kentucky **Zip Code:** 42134

Email: hauke.may@fritzwinter.us

Phone: (270) 813-4000

Air Permit Contact for Source

Name: Eddie Butler

Title: EHS Manager

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** Kentucky **Zip Code:** 42134

Email: eddie.butler@fritzwinter.us

Phone: (270) 813-4000

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name:

Title:

Mailing Address: **Street or P.O. Box:**
City: **State:** **Zip Code:**

Email:

Phone:

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☑ Significant Revision	☐ Administrative Permit Amendment
☐ Renewal Permit	☐ Revised Registration	☐ Minor Revision	☐ Initial Source-wide OperatingPermit
☐ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☑ Revision	☐ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☑ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☑ Yes ☐ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☑ Particulate Matter	34.28	☑ Single HAP	9.9
☑ Volatile Organic Compounds (VOC)	114.49	☑ Combined HAPs	24.9
☑ Carbon Monoxide	312.39	☐ Air Toxics (40 CFR 68, Subpart F)	
☑ Nitrogen Oxides	39.9	☐ Carbon Dioxide	
☑ Sulfur Dioxide	39.9	☐ Greenhouse Gases (GHG)	
☑ Lead	0.59	☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* _____ **Proposed Operation Start-Up Date:** *(MM/YYYY)* _____

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)* Permit Issuance Date **Proposed Operation Start-Up Date:** *(MM/YYYY)* Permit Issuance Date

Applicant is seeking coverage under a permit shield. ☐ Yes ☑ No **Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.**

Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

- ☐ DEP7007A Indirect Heat Exchangers and Turbines
- ☑ DEP7007B Manufacturing or Processing Operations
- ☐ DEP7007C Incinerators and Waste Burners
- ☐ DEP7007F Episode Standby Plan
- ☑ DEP7007J Volatile Liquid Storage
- ☑ DEP7007K Surface Coating or Printing Operations
- ☐ DEP7007L Mineral Processes
- ☐ DEP7007M Metal Cleaning Degreasers
- ☑ DEP7007N Source Emissions Profile
- ☐ DEP7007P Perchloroethylene Dry Cleaning Systems
- ☐ DEP7007R Emission Offset Credit
- ☐ DEP7007S Service Stations
- ☐ DEP7007T Metal Plating and Surface Treatment Operations
- ☑ DEP7007V Applicable Requirements and Compliance Activities
- ☐ DEP7007Y Good Engineering Practice and Stack Height Determination
- ☑ DEP7007AA Compliance Schedule for Non-complying Emission Units
- ☐ DEP7007BB Certified Progress Report
- ☑ DEP7007CC Compliance Certification
- ☐ DEP7007DD Insignificant Activities
- ☑ DEP7007EE Internal Combustion Engines
- ☐ DEP7007FF Secondary Aluminum Processing
- ☑ DEP7007GG Control Equipment
- ☐ DEP7007HH Haul Roads
- ☐ Confidentiality Claim
- ☐ Ownership Change Form
- ☐ Secretary of State Certificate
- ☑ Flowcharts or diagrams depicting process
- ☐ Digital Line Graphs (DLG) files of buildings, roads, etc.
- ☑ Site Map
- ☐ Map or drawing depicting location of facility
- ☑ Safety Data Sheet (SDS)
- ☐ Emergency Response Plan
- ☑ Other: ___ Calcs

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.

[signature]	3-3-22
Authorized Signature	**Date**
Darryl Konsler	CEO
Type or Printed Name of Signatory	**Title of Signatory**

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations
Form identifies revised technical and environmental contact.

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007B

Manufacturing or Processing Operations

___ Section B.1: Process Information
___ Section B.2: Materials and Fuel Information
___ Section B.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.
___ Attach a flow diagram
___ Attach SDS

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 11/30/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU01	Charge Handling	Delivery and storage of scrap steel, alloys and fluxes	EU01	Charge Handling	N/A	N/A	09/2016	Batch	N/A	N/A
EU05	Refractory Burner #1	Portable gas ladle drying unit	EU05	Refractory Burner #1	Gaylord	1.3MM-FDS-63	05/2017 (purchased)	Batch	Varies	Varies
EU06	Refractory Burner #2	Portable gas ladle drying unit	EU06	Refractory Burner #2	Gaylord	1.3MM-FDS-63	05/2017 (purchased)	Batch	Varies	Varies
EU07	Induction Furnace #1	Induction powered melt furnace	EU07	Induction Furnace #1	Junker	MFTGe Duomelt	03/2017	Batch	Varies	Varies
EU08	Induction Furnace #2	Induction powered melt furnace	EU08	Induction Furnace #2	Junker	MFTGe Duomelt	03/2017	Batch	Varies	Varies
EU09	Induction Furnace #3	Induction powered melt furnace	EU09	Induction Furnace #3	Junker	MFTGe Duomelt	07/2019	Batch	Varies	Varies
EU10	Induction Furnace #4	Induction powered melt furnace	EU10	Induction Furnace #4	Junker	MFTGe Duomelt	07/2019	Batch	Varies	Varies

Division for Air Quality

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DEP7007B

Manufacturing or Processing Operations

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Additional Documentation

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___ Attach a flow diagram
___ Attach SDS

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 3/30/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU13	Hot Metal Transfer	Transfer of molten metal from furnaces to pouring furnaces	EU13	Hot Metal Transfer	N/A	Custom fabricated	03/2017	Continuous	N/A	N/A
EU15	Pouring Furnace #1	Receiving and holding of molten metal prior to pouring	EU15	Pouring Furnace #1	Junker	RGDGe	Purchased but not installed	--	--	--
EU16	Pouring Furnace #2	Receiving and holding of molten metal prior to pouring	EU16	Pouring Furnace #2	Junker	RGDGe	03/2017	Continuous	N/A	N/A
EU17	Melt and Core/Mold Baghouse Waste Dust Silo	Receiving and storage of baghouse dust from Melt Shop and Core/Mold Baghouses	EU17	Melt and Core/Mold Baghouse Waste Dust Silo	Luhr	Custom Fabrication	09/2016	Batch	Varies	Varies
EU18	Refractory Curing Mobile Burner	Mobile natural gas burner for curing refractory	EU18	Refractory Curing Mobile Burner	N/K	N/K	5/1/2017 (Purchased)	Batch	Varies	Varies
EU19	Mold Silica Sand Silo	Exterior silo for for receiving and holding of molding silica sand	EU19	Mold Silica Sand Silo	Sand Mold Systems	Custom Fabrication	03/2017	Batch	Varies	Varies
EU20	Blend Silo	Exterior silo for blend of carbonaceous mold sand additives	EU20	Blend Silo	Sand Mold Systems	Custom Fabrication	03/2017	Batch	Varies	Varies

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DEP7007B

Manufacturing or Processing Operations

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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 3/30/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU21	Bentonite Silo	Exterior silo for storage of clays	EU21	Bentonite Silo	Sand Mold Systems	Custom Fabrication	03/2017	Batch	Varies	Varies
EU22	Mold Sand Handling and Preparation	Screens, mullers, bins, hopers, belts to reclaim and prepare mold sand	EU22	Mold Sand Handling and Preparation	Sand Mold Systems	Custom Fabrication	03/2017	Continuous	N/A	N/A

Division for Air Quality

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DEP7007B

Manufacturing or Processing Operations

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KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 3/30/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU33	Mold Making #1	Production of molds using prepared sand and pattern	EU33	Mold Making #1	Heinrich Wagner Sinto	ZFS-SD	01/2017	Batch	Varies	Varies
EU34	Mold Making #2	Production of molds using prepared sand and pattern	EU34	Mold Making #2	--	--	--	--	--	--
EU35A	Core Silica Sand Silo A	Interior silo for the receipt and storage of core sand	EU35A	Core Silica Sand Silo A	Laempe	Custom Fabricated	02/2017	Batch	Varies	Varies
EU35B	Core Silica Sand Silo B	Interior silo for the receipt and storage of core sand	EU35B	Core Silica Sand Silo B	Laempe	Custom Fabricated	02/2017	Batch	Varies	Varies
EU36	Core Sand Handling and Preparation	Sand Classifier, sand bins, and sand hoppers to prepare core sand	EU36	Core Sand Handling and Preparation	Laempe	Custom Fabricated	02/2017	Continuous	N/A	N/A
EU39	Core Machine #1	Production of cores using prepared core sand, resin and catalyst	EU39	Core Machine #1	Leampe	LHL50	03/2017	Batch	Varies	Varies
EU40	Core Machine #2	Production of cores using prepared core sand, resin and catalyst	EU40	Core Machine #2	Leampe	LHL50	03/2019	Batch	Varies	Varies

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Manufacturing or Processing Operations

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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 3/31/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU41	Core Machine #3	Core Making Machine	EU41	Core Machine #3	--	--	--	--	--	--
EU42	Core Machine #4	Core Making Machine	EU42	Core Machine #4	--	--	--	--	--	--
EU43	Core Wash Station #1	Washing of cores following core making	EU43	Core Wash Station #1	N/A	N/A	03/2017	Continuous	N/A	N/A
EU44	Dryer #1	Drying of cores following application of wash	EU44	Dryer #1	ELPO	Custom Fabrication	04/2017	Continuous	N/A	N/A
EU45	Dryer #2	Drying of cores following application of wash	EU45	Dryer #2	ELPO	Custom Fabrication	03/2019	Continuous	N/A	N/A
EU46	Dryer #3	Drying of cores following application of wash	EU46	Dryer #3	--	--	--	--	--	--
EU47	Dryer #4	Drying of cores following application of wash	EU47	Dryer #4	--	--	--	--	--	--
EU50	Pouring #1	Pouring of molten metal into sand molds	EU50	Pouring #1	Junker	RGDGe	03/2017	Continuous	N/A	N/A

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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 3/31/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU51	Pouring #2	Pouring of molten metal into sand molds	EU51	Pouring #2	--	--	--	--	--	--
EU52	Cooling Tunnel	Cooling of casting within sand mold.	EU52	Cooling Tunnel	Heinrich Wagner Sinto	ZFS-SD	01/2017	Continuous	N/A	N/A
EU53	Shakeout Conveyor	Separation of solidified casting and sand mold/core	EU53	Shakeout Conveyor	General Kinematics	Custom Fabrication	01/2017	Continuous	N/A	N/A
EU57	Sand Plant Waste Sand Silo	Silo for Waste Sand	EU57	Sand Plant Waste Sand Silo	Vogel & Schemmann	CBC-9/30	03/2017	Batch	Varies	Varies
EU59	Forced Air Cooler	Vibratory Casting Cooling Conveyor	EU59	Forced Air Cooler	General Kinematics	Custom Fabrication	01/2017	Continuous	N/A	N/A
EU60	Sorting	Finished Product /Casting Scrap separation	EU60	Sorting	General Kinematics	Custom Fabrication	12/2016	Continuous	N/A	N/A

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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 3/31/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU61	Steel Shot Blasting #1	Finished Product Blast Cleaning	EU61	Steel Shot Blasting #1	Vogel & Schemmann	CBC-9/30	04/2017	Continuous	N/A	N/A
EU62	Steel Shot Blasting #2	Finished Product Blast Cleaning	EU62	Steel Shot Blasting #2	--	--	--	--	--	--
EU63	Fettling Baghouse Waste Dust Silo	Outside Fettling Baghouse Waste Dust Silo	EU63	Fettling Baghouse Waste Dust Silo	Luhr	Custom Fabrication	11/2016	Batch	Varies	Varies
EU64	Auto Grinding #1	Grinder for flash removal	EU64	Auto Grinding #1	Reichmann	S1C	02/2019	Continuous	N/A	N/A
EU65	Auto Grinding #2	Grinder for flash removal	EU65	Auto Grinding #2	--	--	--	--	--	--
EU66	Machining Lines (9)	Turn and balance to final product specifications	EU66	Machining Lines (9)	EMAG	VL8	04/2017	Continuous	N/A	N/A
EU67	Perforation Line (1)	Turn, balance & drill to final product specifications	EU67	Perforation Line (1)	EMAG	VL8	04/2017	Continuous	N/A	N/A
EU68	Paint Line #3	Post-induction coating machine	EU68	Paint Line #3	Sturm	ZS16	09/2018	Continuous	N/A	N/A
EU69	Paint Line #2	Post-induction coating machine	EU69	Paint Line #2	Sturm	ZS16	11/2017	Continuous	N/A	N/A

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Manufacturing or Processing Operations

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Additional Documentation

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___ Attach a flow diagram
___ Attach SDS

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 4/1/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU71	Paint Line #1	Pre-induction coating machine	EU71	Paint Line #1	Sturm	ZS16	03/2017	Continuous	N/A	N/A
EU72	Emergency Generator #1	Generators for Emergency Power (750 KW - 1050 HP)	EU72	Emergency Generator #1	Caterpillar	C27	09/2016	--	--	--
EU73	Emergency Generator #2	Generators for Emergency Power (750 KW - 1050 HP)	EU73	Emergency Generator #2	Caterpillar	C27	09/2016	--	--	--
EU74	Emergency Generator #3	Generators for Emergency Power (40KW - 57 HP)	EU74	Emergency Generator #3	Caterpillar	D40-LC2	09/2016	--	--	--
EU75	Diesel Storage Tank	2,000 gal diesel storage tank	EU75	Diesel Storage Tank	N/A	N/A	07/2019	--	--	--
EU76	Paved Roads	Paved Roadways and Parking Areas	EU76	Paved Roads	N/A	N/A	09/2016	--	--	--
EU77	Snag Grinder #1	Grinder for flash removal	EU77	Snag Grinder #1	N/K	N/K	04/2017	Continuous	N/A	N/A
EU78	Snag Grinder #2	Grinder for flash removal	EU78	Snag Grinder #2	N/K	N/K	04/2017	Continuous	N/A	N/A
EU79	Core Wash Station #2	Washing of cores following core making	EU79	Core Wash Station #2	N/A	N/A	03/2019	Continuous	N/A	N/A
EU80	Core Wash Station #3	Washing of cores following core making	EU80	Core Wash Station #3	N/A	N/A	-	Continuous	N/A	N/A

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DEP7007B

Manufacturing or Processing Operations

___ Section B.1: Process Information
___ Section B.2: Materials and Fuel Information
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Additional Documentation

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___ Attach a flow diagram
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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 4/1/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU81	Core Wash Station #4	Washing of cores following core making	EU81	Core Wash Station #4	N/A	N/A	-	Continuous	N/A	N/A
EU82	Rust Preventative Application	Application of rust prohibitor to finished castings	EU82	Rust Preventative Application	N/A	NA	03/2017	Continuous	N/A	N/A

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU01	Charge Handling	Scrap Steel, Alloys, Fluxes	25.3	tons/hr	25.3 tons/hr	Steel Scrap	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU05	Refractory Burner #1	Natural Gas	--	--	--	NA	--	--	Natural Gas	8.5	MMbtu/ Hr	73	MMscf/ Yr	0%	0%
EU06	Refractory Burner #2	Natural Gas	--	--	--	NA	--	--	Natural Gas	8.5	MMbtu/ Hr	73	MMscf/ Yr	0%	0%
EU07	Induction Furnace #1	Scrap Steel, Alloys, Fluxes	10	tons/hr	10 tons/hr	Molten Grey Iron	10	tons/hr	Electric Induction	N/A	--	N/A	--	0%	0%
EU08	Induction Furnace #2	Scrap Steel, Alloys, Fluxes	10	tons/hr	10 tons/hr	Molten Grey Iron	10	tons/hr	Electric Induction	N/A	--	N/A	--	0%	0%
EU09	Induction Furnace #3	Scrap Steel, Alloys, Fluxes	10	tons/hr	10 tons/hr	Molten Grey Iron	10	tons/hr	Electric Induction	N/A	--	N/A	--	0%	0%
EU10	Induction Furnace #4	Scrap Steel, Alloys, Fluxes	10	tons/hr	10 tons/hr	Molten Grey Iron	10	tons/hr	Electric Induction	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

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Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input		Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output		Fuel Type	Maximum Hourly Fuel Usage Rate		Maximum Yearly Fuel Usage Rate		Sulfur Content (%)	Ash Content (%)
				(Specify Units/hr)				(Specify Units/hr)			(Specify Units)		(Specify Units)		
EU13	Hot Metal Transfer	Molten Grey Iron	25.3	tons/hr	25.3 tons/hr	Molten Grey Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU15	Pouring Furnace #1	Molten Grey Iron	25.3	tons/hr	25.3 tons/hr	Molten Grey Iron	25.3	tons/hr	Electric Induction	2.91	MMbtu/ Hr	24.99	MMscf/ Yr	0%	0%
EU16	Pouring Furnace #2	Molten Grey Iron	25.3	tons/hr	25.3 tons/hr	Molten Grey Iron	25.3	tons/hr	Electric Induction	2.91	MMbtu/ Hr	24.99	MMscf/ Yr	0%	0%
EU17	Melt and Core/Mold Baghouse Waste Dust Silo	Molten Grey Iron	25.3	tons/hr	25.3 tons/hr	Molten Grey Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU18	Refractory Curing Mobile Burner	NA	--	--	--	NA	--	--	Natural Gas	2	MMbtu/ Hr	17.18	MMscf/ Yr	0%	0%
EU19	Mold Silica Sand Silo	Sand	25	tons/hr	25 tons/hr	Sand	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU20	Blend Silo	Blend	25	tons/hr	25 tons/hr	Blend	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

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Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU21	Bentonite Silo	Bentonite	25	tons/hr	25 tons/hr	Bentonite	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU22	Mold Sand Handling and Preparation	Sand, clay, preblend and water	197	tons/hr	197 tons/hr	Sand	197	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

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Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU33	Mold Making #1	Prepared Mold Sand	99	tons/hr	99 tons/hr	Green Sand	99	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU34	Mold Making #2	Prepared Mold Sand	99	tons/hr	99 tons/hr	Green Sand	99	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU35A	Core Silica Sand Silo A	Core Sand	25	tons/hr	25 tons/hr	Core Sand	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU35B	Core Silica Sand Silo B	Core Sand	25	tons/hr	25 tons/hr	Core Sand	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU36	Core Sand Handling and Preparation	Core Sand	3.7	tons/hr	3.7 tons/hr	Core Sand	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU39	Core Machine #1	Core Sand Resin Catalyst Release Agent	3.7 92.5 9.25 4.2	tons/hr lbs/hr lbs/hr lbs/hr	3.7	Uncoated Cores	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU40	Core Machine #2	Core Sand Resin Catalyst Release Agent	3.7 92.5 9.25 4.2	tons/hr lbs/hr lbs/hr lbs/hr	3.7	Uncoated Cores	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU41	Core Machine #3	Core Sand Resin Catalyst Release Agent	3.7 92.5 9.25 4.2	tons/hr lbs/hr lbs/hr lbs/hr	3.7 tons/hr	Uncoated Cores	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU42	Core Machine #4	Core Sand Resin Catalyst Release Agent	3.7 92.5 9.25 4.2	tons/hr lbs/hr lbs/hr lbs/hr	3.7 tons/hr	Uncoated Cores	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU43	Core Wash Station #1	Uncoated Cores Wash	3.7 676	tons/hr lbs/hr	3.7 tons/hr	Uncoated Cores	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU44	Dryer #1	Coated Cores	3.7	tons/hr	3.7 tons/hr	Dry Coated Cores	3.7	tons/hr	Natural Gas	4.0	MMbtu/ Hr	34.35	MMscf/yr	0%	0%
EU45	Dryer #2	Coated Cores	3.7	tons/hr	3.7 tons/hr	Dry Coated Cores	3.7	tons/hr	Natural Gas	4.0	MMbtu/ Hr	34.35	MMscf/yr	0%	0%
EU46	Dryer #3	Coated Cores	3.7	tons/hr	3.7 tons/hr	Dry Coated Cores	3.7	tons/hr	Natural Gas	4.0	MMbtu/ Hr	34.35	MMscf/yr	0%	0%
EU47	Dryer #4	Coated Cores	3.7	tons/hr	3.7 tons/hr	Dry Coated Cores	3.7	tons/hr	Natural Gas	4.0	MMbtu/ Hr	34.35	MMscf/yr	0%	0%
EU50	Pouring #1	Molds Cores	99.15 1.8	tons/hr tons/hr	100.9 tons/hr	Mold Assembles	100.9 tons/hr	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

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Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU51	Pouring #2	Assembled Molds Gray Iron	100.9 25.3	tons/hr tons/hr	126.2 tons/hr	Poured mold	126.2	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU52	Cooling Tunnel	Assembled Molds Gray Iron	100.9 25.3	tons/hr tons/hr	126.2 tons/hr	Poured mold	126.2	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU53	Shakeout Conveyor	Poured Mold	126.2	tons/hr	126.2 tons/hr	Poured mold	126.2	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU57	Sand Plant Waste Sand Silo	Recycled Sand	202	tons/hr	202 tons/hr	Recycled Sand	202	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU59	Forced Air Cooler	Gray Iron	25.3	tons/hr	25.3 tons/hr	Gray Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU60	Sorting	Rough Casting	25.3	tons/hr	25.3 tons/hr	Rough Casting	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%

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Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU61	Steel Shot Blasting #1	Rough Casting	25.3	tons/hr	25.3 tons/hr	Cleaned Casting	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU62	Steel Shot Blasting #2	Rough Casting	25.3	tons/hr	25.3 tons/hr	Cleaned Casting	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU63	Fettling Baghouse Waste Dust Silo	Gray Iron	25.3	tons/hr	25.3 tons/hr	Gray Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU64	Auto Grinding #1	Cleaned Casting	25.3	tons/hr	25.3 tons/hr	Ground Cleaned Casting	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU65	Auto Grinding #2	Cleaned Casting	25.3	tons/hr	25.3 tons/hr	Ground Cleaned Casting	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU66	Machining Lines (9)	Gray Iron	25.3	tons/hr	25.3 tons/hr	Gray Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU67	Perforation Line (1)	Gray Iron	25.3	tons/hr	25.3 tons/hr	Gray Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU68	Paint Line #3	Machined Castings Post-Induction Coating Post-Induction Thinner	- 5.75 1.47	- lb/hr lb/hr	N/K	Coated Finished Casting	N/K	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU69	Paint Line #2	Machined Castings Post-Induction Coating Post-Induction Thinner	- 5.75 1.47	- lb/hr lb/hr	N/K	Coated Finished Casting	N/K	tons/hr	N/A	N/A	--	N/A	--	0%	0%

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Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU71	Paint Line #1	Machined Castings Pre-Induction Coating	- - 3.54	- lb/hr	N/K	Coated Finished Casting	N/K	tons/hr	N/A	N/A	--	NA	--	0%	0%
EU72	Emergency Generator #1	--	--	--	N/A	--	--	--	Diesel	N/K	Gallons	N/K	Gallons	0%	0%
EU73	Emergency Generator #2	--	--	--	N/A	--	--	--	Diesel	N/K	Gallons	N/K	Gallons	0%	0%
EU74	Emergency Generator #3	--	--	--	N/A	--	--	--	Diesel	N/K	Gallons	N/K	Gallons	0%	0%
EU75	Diesel Storage Tank	Gasoline	NK	gal/hr	N/A	--	--	Gallons	N/A	N/A	--	N/A	--	0%	0%
EU76	Paved Roads	Diesel	NK	gal/hr	N/A	--	--	Diesel	N/A	N/A	--	N/A	--	0%	0%
EU77	Snag Grinder #1	Cleaned Casting	NK	tons/hr	N/K	Ground Cleaned Casting	N/K	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU78	Snag Grinder #2	Cleaned Casting	NK	tons/hr	N/K	Ground Cleaned Casting	N/K	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU79	Core Wash Station #2	Uncoated Cores Wash	3.7 676	tons/hr lbs/hr	3.7 tons/hr	Coated Cores	N/K	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU80	Core Wash Station #3	Uncoated Cores Wash	3.7 676	tons/hr lbs/hr	3.7 tons/hr	Coated Cores	N/K	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

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Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU81	Core Wash Station #4	Uncoated Cores Wash	3.7 676	tons/hr lbs/hr	3.7 tons/hr	Coated Cores	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU82	Rust Preventative Application	Finished Product Rust Preventative	25.3 20	tons/hr lbs/hr	25.3 tons/hr	Finished Product	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.3: Notes, Comments, and Explanations
The following Emission Units have yet to be installed: EU03, EU04, EU11, EU12, EU15, EU34, EU41, EU42, EU46, EU47, EU49, EU51, EU58, EU62, EU65 (on order/not installed), EU70, EU75
EU77 : Change Paved Roadways from EU76 to EU77 as EU76 is already identified as the ID for the diesel storage tank.
EU11-EU16: Change operating limit to 91,586 tpy; incorrect assumption to split 50:50
EU17: Change description from "Melt Shop Baghouse Waste Dust Silo" to "Core/Mold Baghouse Waste Dust Silo"
EU19-EU21, EU35A-EU35B: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU21-EU34,EU48,EU49: Combine into a single emission unit described as "Moldmaking and Sand Handling" with Emission Unit ID EU21 to match SCC description
EU33-EU34: Change maximum hourly capacity as 1975 tph for the group; incorrect assumption to split 50:50
EU50-EU51: Change maximum hourly capacity to 25.3 tph for group; incorrect assumption to split 50:50
EU68, EU69 and EU71: Change emission unit name to Paint Line #3, Paint Line #2 and Paint Line #1, respectively

DEP7007K

Surface Coating or Printing Operations

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

__ Section K.1: Process Information

__ Section K.2: Coating Operations

__ Section K.3: Other Operations

__ Section K.4: Coatings/Printing Materials as Applied

__ Section K.5: HAP-containing Coatings/Printing Materials

__ Section K.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

___ Attach SDS or Technical Sheets for all Coating/Printing Materials

___ Attach a flow diagram

Source Name: **Fritz Winter North America, LP**

KY EIS (AFS) #: **21- 213-00064**

Permit #: **V-16-022 R1**

Agency Interest (AI) ID: **129745**

Date: **11/30/2021**

Section K.1: Process Information

Emission Unit #: EU68

Emission Unit Name: Paint Liine #3

Coating/Printing Line Name: Paint Line #3

Proposed/Actual Date of Construction: *(MM/YYYY)* Sep-18

List Applicable Regulations: See Air Permit V-16-022 R1

Describe Overall Process: See Air Permit V-16-022 R1

Describe Coatings/Printing Materials: See Air Permit V-16-022 R1

Identify the Material that is Coated/Printed: ☑ Metal ☐ Vinyl ☐ Plastics ☐ Wood ☐ Foil ☐ Paper ☐ Other Substrate

Provide detailed description of material coated/printed: See Air Permit V-16-022 R1

Provide approximate dimensions and range of sizes of parts being coated or printed:

Identify the Type of Operation: ☑ Continuous ☐ Batch ☐ Other:

Describe Surface Preparation/Pretreatment Steps: None

For Coating Operations: ☑ Spray ☐ Flow ☐ Dip tank ☐ Electrodeposition ☐ Brush ☐ Powder ☐ Roller Coat ☐ Other:

For Printing Operations: *(Select all that apply)* ☐ Web ☐ Rotogravure ☐ Heatset ☐ Lithographic ☐ Other: ☐ Sheetfed ☐ Letterpress ☐ Non-heatset ☐ Flexographic

Describe Final Product: Cast Iron Part

Check the category that most closely describes this unit:

☐ Large Appliance Coating	☐ Auto or Light-Duty Truck Coating	☐ Metal Furniture Coating	☐ Metal Coil Coating
☐ Beverage Can Coating	☑ Miscellaneious Metal Parts Coating	☐ Magnet Wire Insulation Coating	☐ Flat Wood Panel Coating
☐ Fabric, Vinyl, or Paper Coating	☐ Boat Manufacturing/ Ship Repair	☐ Pressure Sensitive Tape and Label Coating	☐ Magnet Tape Coating
☐ Publication Rotogravure Printing	☐ Coating of Plastic Parts for Business Machines	☐ Flexible Vinyl and Urethane Coating and Printing	
☐ Graphic Arts using Rotogravure and Flexographic Printing			☐ Other:

Section K.2: Coating Operations

K.2A: For Spray Coating

Gun/Booth ID	Describe Function	Type	Mode	Maximum Design Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
Paint Line #3		☐ Conventional Air Gun ☑ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☑ Automatic	5.75 1.47	lb/hr lb/hr	☐ Testing ☐ Equipment Specification Sheet ☑ Estimation
		☐ Conventional Air Gun ☐ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☐ Automatic			☐ Testing ☐ Equipment Specification Sheet ☐ Estimation
		☐ Conventional Air Gun ☐ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☐ Automatic			☐ Testing ☐ Equipment Specification Sheet ☐ Estimation

If spray guns are used simultaneously, describe:

K.2B: For Brush Coating

Describe Function:

Maximum Coating Application Rate: *(gal/hr)*

K.2C: For Roller Coating

Roller Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr)*	Describe how maximum rate was determined
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

K.2D: For Powder Coating

Powder Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

If powder coating material is recycled, describe:

K.2E: For Flow Coating

Flow Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

K.2F: For Dip Tank/Electrodeposition Coating

Tank ID	Describe Function	Maximum Make-up Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

Section K.3: Other Operations

K.3A: For Finishing

Describe Finishing Processes: *Complete Form DEP7007B as applicable*	None

K.3B: For Curing/Drying

Describe Curing/Drying Processes:	**Description**	**Rated Capacity** *(MMBtu/hr)*	**Fuel**	**Control Device/Stack ID**

K.3C: For Purge

Type: _____

Daily Usage: _____ gal/day

K.3D: For Clean-up

Type: ☐ Manual ☐ Automatic

Daily Usage: _____ hrs/day

Operating Hours: _____

K.3E: For Other Equipment

Describe Processes:	

Section K.4: Coatings/Printing Materials As Applied

Include SDS or Technical Sheets for all coating/printing materials used.

Trade Name of Material	Description *(Identify as coating, ink, fountain solution, blanket wash, cleaning solvent, thinning solvent, auto wash, manual wash, etc.)*	Emission Unit/Coating ID where material is used	SCC Code	SCC Code Units	Density *(lb/gal)*	Solid Content *(lb/gal)*	VOC Content *(lb/gal)*	Emission Factor for PM* *(lb/SCC)*	Transfer Efficiency *(%)*	Emission Factor for VOC *(lb/SCC)*	Capture Efficiency *(%)*	Control Device/ Stack ID
Worwag Coating Primer	Primer	EU68	-	-	25.75	22.4	3.42	-	70	-	100	CU14/ST15A
Warwag Coating Reducer	Thinner	EU68	-	-	7.26	0	7.26	-	N/A	-	100	CU14/ST15A

**Emission factor for particulate matter (PM) should not include transfer efficiency.*

Section K.5: Hazardous Air Pollutant-containing Coatings/Printing Materials

List each individual hazardous air pollutant (HAP) contained in each material.

Trade Name of Material	HAP Name	HAP CAS #	Identify Solid (*S*) or Volatile (*V*)	HAP % by weight	HAP Emission Factor *(lb/SCC)*	Control Device/ Stack ID
Worwag Coating Primer	Benzene	71-43-2	V	0.01%	-	CU14/ST15A
Worwag Coating Primer	Cumene	98-82-8	V	0.06%	-	CU14/ST15A
Worwag Coating Primer	Ethyl Benzene	100-41-4	V	0.95%	-	CU14/ST15A
Worwag Coating Primer	Toluene	108-88-3	V	0.02%	-	CU14/ST15A
Worwag Coating Primer	Xylene	1330-20-7	V	3.89%	-	CU14/ST15A
Warwag Coating Reducer	Cumene	98-82-8	V	0.54%	-	CU14/ST15A
Warwag Coating Reducer	Ethyl Benzene	100-41-4	V	3.30%	-	CU14/ST15A
Warwag Coating Reducer	Xylene	1330-20-7	V	6.19%	-	CU14/ST15A

Section K.6: Notes, Comments, and Explanations

DEP7007K

Surface Coating or Printing Operations

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
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Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

___ Attach SDS or Technical Sheets for all Coating/Printing Materials

___ Attach a flow diagram

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 11/30/2021

Section K.1: Process Information

Emission Unit #: EU69

Emission Unit Name: Paint Liine #2

Coating/Printing Line Name: Paint Line #2

Proposed/Actual Date of Construction: *(MM/YYYY)* Nov-17

List Applicable Regulations: See Air Permit V-16-022 R1

Describe Overall Process: See Air Permit V-16-022 R1

Describe Coatings/Printing Materials: See Air Permit V-16-022 R1

Identify the Material that is Coated/Printed: ☑ Metal ☐ Vinyl ☐ Plastics ☐ Wood ☐ Foil ☐ Paper ☐ Other Substrate

Provide detailed description of material coated/printed: See Air Permit V-16-022 R1

Provide approximate dimensions and range of sizes of parts being coated or printed:

Identify the Type of Operation: ☑ Continuous ☐ Batch ☐ Other:

Describe Surface Preparation/Pretreatment Steps: None

For Coating Operations: ☑ Spray ☐ Flow ☐ Dip tank ☐ Electrodeposition ☐ Brush ☐ Powder ☐ Roller Coat ☐ Other:

For Printing Operations: *(Select all that apply)* ☐ Web ☐ Rotogravure ☐ Heatset ☐ Lithographic ☐ Other: ☐ Sheetfed ☐ Letterpress ☐ Non-heatset ☐ Flexographic

Describe Final Product: Cast Iron Part

Check the category that most closely describes this unit:

☐ Large Appliance Coating	☐ Auto or Light-Duty Truck Coating	☐ Metal Furniture Coating	☐ Metal Coil Coating
☐ Beverage Can Coating	☑ Miscellaneious Metal Parts Coating	☐ Magnet Wire Insulation Coating	☐ Flat Wood Panel Coating
☐ Fabric, Vinyl, or Paper Coating	☐ Boat Manufacturing/ Ship Repair	☐ Pressure Sensitive Tape and Label Coating	☐ Magnet Tape Coating
☐ Publication Rotogravure Printing	☐ Coating of Plastic Parts for Business Machines	☐ Flexible Vinyl and Urethane Coating and Printing	
☐ Graphic Arts using Rotogravure and Flexographic Printing			☐ Other:

Section K.2: Coating Operations

K.2A: For Spray Coating

Gun/Booth ID	Describe Function	Type	Mode	Maximum Design Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
Paint Line #2		☐ Conventional Air Gun ☑ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☑ Automatic	5.75 1.47	lb/hr lb/hr	☐ Testing ☐ Equipment Specification Sheet ☑ Estimation
		☐ Conventional Air Gun ☐ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☐ Automatic			☐ Testing ☐ Equipment Specification Sheet ☐ Estimation
		☐ Conventional Air Gun ☐ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☐ Automatic			☐ Testing ☐ Equipment Specification Sheet ☐ Estimation

If spray guns are used simultaneously, describe:

K.2B: For Brush Coating

Describe Function:

Maximum Coating Application Rate: *(gal/hr)*

K.2C: For Roller Coating

Roller Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr)*	Describe how maximum rate was determined
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

K.2D: For Powder Coating

Powder Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

If powder coating material is recycled, describe:	

K.2E: For Flow Coating

Flow Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

K.2F: For Dip Tank/Electrodeposition Coating

Tank ID	Describe Function	Maximum Make-up Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

Section K.3: Other Operations

K.3A: For Finishing

Describe Finishing Processes: *Complete Form DEP7007B as applicable*	None

K.3B: For Curing/Drying

Describe Curing/Drying Processes:	**Description**	**Rated Capacity** *(MMBtu/hr)*	**Fuel**	**Control Device/Stack ID**

K.3C: For Purge

Type: _____

Daily Usage: _____ gal/day

K.3D: For Clean-up

Type: ☐ Manual ☐ Automatic

Daily Usage: _____ hrs/day

Operating Hours: _____

K.3E: For Other Equipment

Describe Processes:	

Section K.4: Coatings/Printing Materials As Applied

Include SDS or Technical Sheets for all coating/printing materials used.

Trade Name of Material	Description *(Identify as coating, ink, fountain solution, blanket wash, cleaning solvent, thinning solvent, auto wash, manual wash, etc.)*	Emission Unit/Coating ID where material is used	SCC Code	SCC Code Units	Density *(lb/gal)*	Solid Content *(lb/gal)*	VOC Content *(lb/gal)*	Emission Factor for PM* *(lb/SCC)*	Transfer Efficiency *(%)*	Emission Factor for VOC *(lb/SCC)*	Capture Efficiency *(%)*	Control Device/ Stack ID
Worwag Coating Primer	Primer	EU68	-	-	25.75	22.4	3.42	-	70	-	100	CU15/ST15B
Warwag Coating Reducer	Thinner	EU68	-	-	7.26	0	7.26	-	N/A	-	100	CU15/ST15B

**Emission factor for particulate matter (PM) should not include transfer efficiency.*

Section K.5: Hazardous Air Pollutant-containing Coatings/Printing Materials

List each individual hazardous air pollutant (HAP) contained in each material.

Trade Name of Material	HAP Name	HAP CAS #	Identify Solid (*S*) or Volatile (*V*)	HAP % by weight	HAP Emission Factor *(lb/SCC)*	Control Device/ Stack ID
Worwag Coating Primer	Benzene	71-43-2	V	0.01%	-	CU15/ST15B
Worwag Coating Primer	Cumene	98-82-8	V	0.06%	-	CU15/ST15B
Worwag Coating Primer	Ethyl Benzene	100-41-4	V	0.95%	-	CU15/ST15B
Worwag Coating Primer	Toluene	108-88-3	V	0.02%	-	CU15/ST15B
Worwag Coating Primer	Xylene	1330-20-7	V	3.89%	-	CU15/ST15B
Warwag Coating Reducer	Cumene	98-82-8	V	0.54%	-	CU15/ST15B
Warwag Coating Reducer	Ethyl Benzene	100-41-4	V	3.30%	-	CU15/ST15B
Warwag Coating Reducer	Xylene	1330-20-7	V	6.19%	-	CU15/ST15B

Section K.6: Notes, Comments, and Explanations

DEP7007K

Surface Coating or Printing Operations

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

__ Section K.1: Process Information

__ Section K.2: Coating Operations

__ Section K.3: Other Operations

__ Section K.4: Coatings/Printing Materials as Applied

__ Section K.5: HAP-containing Coatings/Printing Materials

__ Section K.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

___ Attach SDS or Technical Sheets for all Coating/Printing Materials

___ Attach a flow diagram

Source Name: **Fritz Winter North America, LP**

KY EIS (AFS) #: **21- 213-00064**

Permit #: **V-16-022 R1**

Agency Interest (AI) ID: **129745**

Date: **11/30/2021**

Section K.1: Process Information

Emission Unit #: EU71

Emission Unit Name: Paint Liine #1

Coating/Printing Line Name: Paint Line #1

Proposed/Actual Date of Construction: *(MM/YYYY)* Mar-17

List Applicable Regulations: See Air Permit V-16-022 R1

Describe Overall Process: See Air Permit V-16-022 R1

Describe Coatings/Printing Materials: See Air Permit V-16-022 R1

Identify the Material that is Coated/Printed: ☑ Metal ☐ Vinyl ☐ Plastics ☐ Wood ☐ Foil ☐ Paper ☐ Other Substrate

Provide detailed description of material coated/printed: See Air Permit V-16-022 R1

Provide approximate dimensions and range of sizes of parts being coated or printed:

Identify the Type of Operation: ☑ Continuous ☐ Batch ☐ Other:

Describe Surface Preparation/Pretreatment Steps: None

For Coating Operations: ☑ Spray ☐ Flow ☐ Dip tank ☐ Electrodeposition ☐ Brush ☐ Powder ☐ Roller Coat ☐ Other:

For Printing Operations: *(Select all that apply)* ☐ Web ☐ Rotogravure ☐ Heatset ☐ Lithographic ☐ Other: ☐ Sheetfed ☐ Letterpress ☐ Non-heatset ☐ Flexographic

Describe Final Product: Cast Iron Part

Check the category that most closely describes this unit:

☐ Large Appliance Coating	☐ Auto or Light-Duty Truck Coating	☐ Metal Furniture Coating	☐ Metal Coil Coating
☐ Beverage Can Coating	☑ Miscellaneious Metal Parts Coating	☐ Magnet Wire Insulation Coating	☐ Flat Wood Panel Coating
☐ Fabric, Vinyl, or Paper Coating	☐ Boat Manufacturing/ Ship Repair	☐ Pressure Sensitive Tape and Label Coating	☐ Magnet Tape Coating
☐ Publication Rotogravure Printing	☐ Coating of Plastic Parts for Business Machines	☐ Flexible Vinyl and Urethane Coating and Printing	
☐ Graphic Arts using Rotogravure and Flexographic Printing			☐ Other:

Section K.2: Coating Operations

K.2A: For Spray Coating

Gun/Booth ID	Describe Function	Type	Mode	Maximum Design Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
Paint Line #3		☐ Conventional Air Gun ☑ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☑ Automatic	3.54	lb/hr	☐ Testing ☐ Equipment Specification Sheet ☑ Estimation
		☐ Conventional Air Gun ☐ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☐ Automatic			☐ Testing ☐ Equipment Specification Sheet ☐ Estimation
		☐ Conventional Air Gun ☐ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☐ Automatic			☐ Testing ☐ Equipment Specification Sheet ☐ Estimation

If spray guns are used simultaneously, describe:

K.2B: For Brush Coating

Describe Function:

Maximum Coating Application Rate: *(gal/hr)*

K.2C: For Roller Coating

Roller Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr)*	Describe how maximum rate was determined
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

K.2D: For Powder Coating

Powder Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

If powder coating material is recycled, describe:	

K.2E: For Flow Coating

Flow Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

K.2F: For Dip Tank/Electrodeposition Coating

Tank ID	Describe Function	Maximum Make-up Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

Section K.3: Other Operations

K.3A: For Finishing

Describe Finishing Processes: *Complete Form DEP7007B as applicable*	None

K.3B: For Curing/Drying

Describe Curing/Drying Processes:	Description	Rated Capacity *(MMBtu/hr)*	Fuel	Control Device/Stack ID

K.3C: For Purge

Type: _____

Daily Usage: _____ gal/day

K.3D: For Clean-up

Type: ☐ Manual ☐ Automatic

Daily Usage: _____ hrs/day

Operating Hours: _____

K.3E: For Other Equipment

Describe Processes:	

Section K.4: Coatings/Printing Materials As Applied

Include SDS or Technical Sheets for all coating/printing materials used.

Trade Name of Material	Description *(Identify as coating, ink, fountain solution, blanket wash, cleaning solvent, thinning solvent, auto wash, manual wash, etc.)*	Emission Unit/Coating ID where material is used	SCC Code	SCC Code Units	Density *(lb/gal)*	Solid Content *(lb/gal)*	VOC Content *(lb/gal)*	Emission Factor for PM* *(lb/SCC)*	Transfer Efficiency *(%)*	Emission Factor for VOC *(lb/SCC)*	Capture Efficiency *(%)*	Control Device/ Stack ID
Geomet 360	Primer	EU71	-	-	11.05	7.05	4	-	70	-	100	CU14/ST15A
DI Water	Thinner	EU71	-	-	8.34	-	-	-	N/A	-	100	CU14/ST15A

**Emission factor for particulate matter (PM) should not include transfer efficiency.*

Section K.5: Hazardous Air Pollutant-containing Coatings/Printing Materials

List each individual hazardous air pollutant (HAP) contained in each material.

Trade Name of Material	HAP Name	HAP CAS #	Identify Solid (*S*) or Volatile (*V*)	HAP % by weight	HAP Emission Factor *(lb/SCC)*	Control Device/ Stack ID
Geomet 360	Methanol	67-56-1	V	3.40%	-	CU17/ST16

Section K.6: Notes, Comments, and Explanations

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007J

Volatile Liquid Storage

___ Section J.1: General Information

___ Section J.2: Tank Description

___ Section J.3: Gasoline Plants and Terminals

___ Section J.4: Loading Rack(s)

___ Section J.5: Equipment Leaks

___ Section J.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

___ SDS attached

Source Name: **Fritz Winter North America, LP**

KY EIS (AFS) #: **21- 213-00064**

Permit #: **V-16-022 R1**

Agency Interest (AI) ID: **129745**

Date: **11/31/2021**

Section J.1: General Information

Emission Unit #	Emission Unit Name	Emission Unit Description	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Date of modification/ reconstruction	Control Device ID	Stack ID
EU75	Diesel Storage Tank	1,000 gallon Diesel Storage Tank	Jul-19	N/A	N/A	STTK1

Section J.2: Tank Description

Emission Point #: STTK1

Emission Point Name: Diesel Storage Tank Vent

Tank ID#: EU75

Date Installed: Jul-19

List Applicable Regulations: 401 KAR 51:017, Prevention of significant deterioration of air quality

J.2A: Stored Liquid Data:

Single or Multi-Component Liquid Name(s)	Maximum Annual Throughput *(gal/yr)*	Liquid Density *(lb/gal)*	Molecular Weight of Single or Multi-Component Liquid	Percent Composition of Multi-Component Liquid(s)	Temperature *(°F)*		Vapor Pressure *(psia)*	
					Minimum	Maximum	Minimum	Maximum
Diesel Fuel	24000	6.943	130 lb/lb-mole	N/A	56	65	0.0059	0.0079

J.2B: Tank Data:

Tank Capacity: *(gallons)* 1,000 **Shell Height/ Length:** *(ft)* 11 **Shell Diameter:** *(ft)* 5.7 **Tank Turnovers per Year:** 16

Tank Orientation: ☑ Horizontal ☐ Vertical If Vertical, provide Maximum Liquid Height: *(ft)* _____ Average Liquid Height: *(ft)* 4.16

Shell Color/Shade: ☐ Red ☑ White ☐ Light Gray ☐ Medium Gray ☐ Aluminum Specular ☐ Aluminum Diffuse ☐ Other: _____

Roof Color: ☐ Slack ☑ White ☐ Light Gray ☐ Medium Gray ☐ Aluminum Specular ☐ Aluminum Diffuse ☐ Other: _____

Tank Type: ☑ Fixed Roof ☐ Internal Floating Roof ☐ External Floating Roof ☐ Pressure Tank

J.2C: For Fixed Roof Tanks:

Roof Type: ☐ Dome ☐ Flat ☐ Cone **Dome/Cone Height:** _____ ft **Average Vapor Space Height:** _____ ft

Is Tank Underground?: ☐ Yes ☑ No **Roof Condition:** ☑ Good ☐ Poor **Vacuum Setting:** _____ psig

Is Tank Heated?: ☐ Yes ☑ No **Shell Condition:** ☑ Good ☐ Poor **Pressure Setting:** _____ psig

J.2D: For All Internal Floating Roof Tanks:

Rim Seal Description: ☐ Vapor Mounted Primary ☐ Vapor Mounted Primary plus Secondary Seal ☐ Shoe Mounted ☐ Liquid Mounted Primary ☐ Liquid Mounted Primary plus Secondary Seal ☐ Shoe Mounted plus Secondary Seal

Secondary Seal: ☐ Rim Mounted ☐ Shoe Mounted ☐ None

Internal Shell Condition: ☐ Light Rust ☐ Dense Rust ☐ Gunite-lined **External Shell Condition:** ☐ Good ☐ Poor

Roof Paint Condition: ☐ Good ☐ Poor **Self Supporting Roof?** ☐ Yes ☐ No

Number of Support Columns: _____ **Effective Column Diameter:** _____ ft

J.2E: Deck Data for Internal Floating Roofs:

Length of Deck Seam: _____ ft

Deck Type: ☐ Bolted ☐ Welded

Type of Deck Fitting: ☐ Access Hatch ☐ Ladder Well ☐ Sample Pipe ☐ Sample Well ☐ Vacuum Breaker

Type of Deck Fitting:

☐ Column Well ☐ Roof Leg ☐ Hanger Well ☐ Stub Drain ☐ Automatic Gauge Float Well

Design of each deck fitting:
(diameter sizes, bolted or gasket covers, sliding cover or fabric seal, adjustable or fixed roof leg/hanger well and number)

J.2F: For All External Floating Roof Tanks:

Rim Seal Description:

☐ Vapor Mounted Primary ☐ Vapor Mounted Primary Rim Secondary Seal ☐ Vapor Mounted Prmary with Weather Shield
☐ Liquid Mounted Primary ☐ Liquid Mounted Primary Rim Secondary Seal ☐ Liquid Mounted Primary with Weather Shield
☐ Shoe Mounted Primary ☐ Shoe Mounted Primary Rim Secondary Seal ☐ Shoe Mounted Primary Shoe Secondary

Internal Shell Condition: ☐ Light Rust ☐ Dense Rust ☐ Gunite-lined

Tank Type: ☐ Riveted ☐ Welded

Roof Type: ☐ Pontoon Roof ☐ Double Deck Roof

J.2G: Deck Data for External Floating Roof Tanks:

Type of Deck Fitting:

☐ Access Hatch ☐ Gauge Hatch ☐ Sample Well ☐ Roof Leg ☐ Vacuum Breaker
☐ Guide Pole ☐ Gauge Float ☐ Roof Drain ☐ Rim Vent ☐ Other

Design of each deck fitting:
(diameter sizes, bolted or gasket covers, sliding cover, unslotted or slotted guide pole well, adjusted or fixed roof leg and number of each design)

J.2H: Emissions Data:

Attach SDS/Composition Analysis for Each Component Listed

Process ID	Component Name	Process Name (e.g. Breathing, Working, Cleaning, Flashing Loss(es))	Lost Emissions *(lb/1000 gal)*	Frequency of Occurrence	Determination Methodology for Each Type of Loss*

Section J.3: Gasoline Plants and Terminals

Indicate the percentage of one or more of the following modes of transportation for incoming liquid and outgoing liquid:

	Tank Truck	Trailer	Railcar	Pipeline	Marine Tank	Barge	Other (Specify)
Incoming Liquid Material:							
Outgoing Liquid Material:							

For Gasoline Dispensing Facilities (GDF) only:

Is the loading of gasoline storage tanks at a GDF located at an area source of hazardous air pollutants as defined in 40 CFR 63.2? ☐ Yes ☐ No

Is there the dispensing of gasoline from a fixed storage tank at a GDF into a portable tank for the on-site delivery and subsequent dispensing into gasoline-fueled equipment? ☐ Yes ☐ No

Maximum monthly throughput in gallons: _____

For Bulk Gasoline Plants Only:

Is the maximum calculated design throughput less than 20,000 gallons (75,700 liters) per day? ☐ Yes ☑ No

Is gasoline loaded into cargo tanks for transport to gasoline dispensing facilities? ☐ Yes ☐ No

For Bulk Gasoline Terminals Only:

Is the maximum calculated design throughput equal to or greater than 20,000 gallons (75,700 liters) per day? ☐ Yes ☐ No

Is the terminal located at an area source of hazardous air pollutants as defined in 40 CFR 63.2? ☐ Yes ☐ No

Does the facility load from marine tank vessel loading operations at all loading berths less than 1.6 billion liters (10 M barrels) of gasoline annually and of less than 32 billion liters (200 M barrels) of crude oil annually? ☐ Yes ☐ No

Does the terminal handle any reformatted or oxygenated gasoline containing methyl tertbutyl ether (MTBE), CF? ☐ Yes ☐ No

Indicate the type of vapor control device utilized: ☐ Incinerator ☐ Adsorber ☐ Other

Section J.4: Loading Rack(s)

Emission Point #: _____

Emission Point Name: _____

Loading Rack ID#: _____

Product Type	**Number of Lanes/Rack**	**Number of risers/loading arms per rack**	**Does the petroleum storage capacity exceed 300,000 barrels?** *(Y/N)*	**Time required to load standard size tanker** *(minutes)*	**Barge/Pipeline Unloading Rate** *(barrels/hr)*	**Barge/Pipeline Unloading Rate** *(barrels/yr)*	**Maximum Loaded** *(gal/hr)*	**Maximum Loaded** *(gal/yr)*	**Stack ID**	**Control Device ID**

Section J.5: Equipment Leaks

Emission Point #: _____

Emission Point Name: _____

This section is to be completed for all components of Volatile Liquid Storage Systems that may have leaks.

Equipment Type	Indicate the number of each type of equipment for this emission point		Emission Factor *(lb/SCC units)*		Source of Emission Factor	Total Emissions *(lb/yr)*
	Gasoline	Other (diesel, kerosene, etc.)	Gasoline	Other		
Valves						
Pumps						
Connectors						
Risers/Loading-Arm Valves						
Open-ended Lines						
Other						

Section J.6: Notes, Comments, and Explanations
Capacity changed from 2,000 gallon in air permit to actual 1,000 gallon installed tank

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007EE

Internal Combustion Engines

___ Section EE.1: General Information
___ Section EE.2: Operating Information
___ Section EE.3: Design Information
___ Section EE.4: Fuel Information
___ Section EE.5: Emission Factor Information
___ Section EE.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG

___ Attach EPA certification of the engine

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 11/30/2021

Section EE.1: General Information

Emission Unit #	Emission Unit Name	Control Device ID	Stack ID	Manufacturer	Model Number	Model Year	Date of Manufacture	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Date Reconstructed/ Modified	List Applicable Regulations
EU72	Emergency Generator #1 (750 KW)	N/A	STG1	Caterpillar	C27	2016	2016	09/2016	N/A	401 KAR 51:017 401 KAR 670:005, Sec 2(2)(dddd) 401 KAR 670:005, Sec 2(2)(eeee)
EU73	Emergency Generator #2 (750 KW)	N/A	STG2	Caterpillar	C27	2016	2016	09/2016	N/A	401 KAR 51:017 401 KAR 670:005, Sec 2(2)(dddd) 401 KAR 670:005, Sec 2(2)(eeee)
EU74	Emergency Generator #3 (40 KW)	N/A	STG3	Caterpillar	D40-LC2	2016	2016	09/2016	N/A	401 KAR 51:017 401 KAR 670:005, Sec 2(2)(dddd) 401 KAR 670:005, Sec 2(2)(eeee)

Section EE.2: Operating Information

Emission Unit #	Engine Purpose (Identify if Non-Emergency, Emergency,Fire/Water Pump, Black-start engine for combustion turbine, Engine Testing)	Hours Operated	Is this engine a rental? *(Yes/No)*	Rental Time Period *(hrs)*	Alternate Operating Scenarios (Describe any operating scenarios in which the engine may be used in a different configuration)
EU72	Emergency Generator	100	No	N/A	No
EU73	Emergency Generator	100	No	N/A	No
EU74	Emergency Generator	100	No	N/A	No

Section EE.3: Design Information

Emission Unit #	Engine Type (Identify all that apply: Commercial, Institutional, Stationary, Non-Road)	Ignition Type (Identify if either Compression or Spark Ignition)	Engine Family (Identify all that apply: 2-stroke, 4-stroke, Rich Burn, Lean Burn)	Maximum Engine Power *(bhp)*	Maximum Engine Speed *(rpm)*	Total Displacement *(L)*	Number of Cylinders
EU72	Stationary	Compression	N/A	1050	1800	27	12
EU73	Stationary	Compression	N/A	1050	1800	27	12
EU74	Stationary	Compression	4-stroke	56	1800	4.4	4

Section EE.4: Fuel Information

Emission Unit #	Identify if Primary, Secondary, or Tertiary Fuel	Fuel Type (Identify if Diesel, Gasoline, Natural Gas, Liquefied Petroleum Gas (LPG), Landfill/Digester Gas, or Other)	Fuel Grade	Percent Time Used *(%)*	Maximum Fuel Consumption	Heat Content	Sulfur Content *(%)*	SCC Code	SCC Units
EU72	Primary	Diesel	N/A	100	53.6 gal/hr	0.139 MMBtu/gal	500 ppm	20100102	lb/MMBtu
EU73	Primary	Diesel	N/A	100	53.6 gal/hr	0.139 MMBtu/gal	500 ppm	20100102	lb/MMBtu
EU74	Primary	Diesel	N/A	100	3.7 gal/hr	0.139 MMBtu/gal	500 ppm	20100102	lb/MMBtu

Section EE.5: Emission Factor Information

Emission factors expressed here are based on the potential to emit.

Emission Unit #	Fuel	Pollutant	Emission Factor	Emission Factor Units	Source of Emission Factor
EU72	Diesel	See Emission Calculations	See Emission Calculations	See Emission Calculations	See Emission Calculations
EU73	Diesel	See Emission Calculations	See Emission Calculations	See Emission Calculations	See Emission Calculations
EU74	Diesel	See Emission Calculations	See Emission Calculations	See Emission Calculations	See Emission Calculations

Section EE.6: Notes, Comments, and Explanations

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007GG

Control Equipment

Additional Documentation

___ Complete Sections GG.1 through GG.12, as applicable

___ Attach manufacturer's specifications for each control device

___ Complete DEP7007AI

Source Name: **Fritz Winter North America, LP**

KY EIS (AFS) #: **21- 213-00064**

Permit #: **V-16-022 R1**

Agency Interest (AI) ID: **129745**

Date: **11/30/2021**

Section GG.1: General Information - Control Equipment

Control Device ID #	Control Device Name	Cost	Manufacturer	Model Name/ Serial #	Date Installed	Inlet Gas Stream Data For All Control Devices					Inlet Gas Stream Data For Condensers, Adsorbers, Afterburners, Incinerators, Oxidizers Only			Equipment Operational Data For All Control Devices		
						Temperature (°F)	Flowrate (scfm @ 68°F)	Average Particle Diameter (μm)	Particle Density (lb/ft^3) or Specific Gravity	Gas Density (lb/ft^3)	Gas Moisture Content (%)	Gas Composition	Fan Type	Pressure Drop Range (in. H_2O)	Pollutants Collected/ Controlled	Pollutant Removal (%)
CU01	Melt Baghouse	--	Luehr Filter	3249.01/16	Aug-16	90.0	153600	N/K	N/K	N/K	N/A	N/A	N/A	0.5-12.0	Particulate Matter	99+
CU02	Melt and Core/Mold Baghouse	--	Luehr Filter	Custom Fabrication	Aug-16	68.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99+
CU03	Mold Silica Sand Silo Bin Vent Filter	--	Sand Mold Systems	Custom Fabrication	Aug-16	68.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99+
CU04	Blend Silo Bin Vent Filter	--	Sand Mold Systems	Custom Fabrication	Aug-16	68.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99+
CU05	Bentonite Silo Bin Vent Filter	--	Sand Mold Systems	Custom Fabrication	Aug-16	68.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99+
CU06	Sand Plant Baghouse	--	Luehr Filter	3249.02/16	Aug-16	80.0	102667	N/K	N/K	N/K	N/A	N/A	N/A	0.5-12.0	Particulate Matter	99+
CU07	Acid Scrubber	--	BGT	GKX 24	Aug-16	68.0	15000	N/K	N/K	N/K	N/A	N/A	N/A	0.25-8.0	Amine Gas	98+
CU08	Core/Mold Baghouse	--	Luehr Filter	3249.04/16	Oct-18	90.0	110400	N/K	N/K	N/K	N/A	N/A	N/A	0.5-12.0	Particulate Matter	99+
CU10	Sand Plant Baghouse Waste Sand Silo	--	Sand Mold Systems	Custom Fabrication	Aug-16	68	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99+

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

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DEP7007GG

Control Equipment

Additional Documentation

___ Complete Sections GG.1 through GG.12, as applicable

___ Attach manufacturer's specifications for each control device

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 11/30/2021

Section GG.1: General Information - Control Equipment

Control Device ID #	Control Device Name	Cost	Manufacturer	Model Name/ Serial #	Date Installed	Inlet Gas Stream Data For All Control Devices					Inlet Gas Stream Data For Condensers, Adsorbers, Afterburners, Incinerators, Oxidizers Only			Equipment Operational Data For All Control Devices		
						Temperature (°F)	Flowrate (scfm @ 68°F)	Average Particle Diameter (μm)	Particle Density (lb/ft^3) or Specific Gravity	Gas Density (lb/ft^3)	Gas Moisture Content (%)	Gas Composition	Fan Type	Pressure Drop Range (in. H_2O)	Pollutants Collected/ Controlled	Pollutant Removal (%)
CU11	Fettling Baghouse	--	Luehr Filter	3249.03/16	Aug-16	55	66641	N/K	N/K	N/K	N/A	N/A	N/A	0.5-12	Particulate Matter	99+
CU12	Fettling Baghouse Waste Dust Silo Bin Vent Filter	--	Luehr Filter	Custom Fabrication	Apr-17	68.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99+
CU13a-CU13h	Machining Lines Cartridge Filters	--	EMAG	VL8	Jun-17	68	598	N/K	N/K	N/K	N/A	N/A	N/A	0.1-6.0	Particulate Matter	99+
CU13i-CU13j	Perforation Line Cartridge Collectors	--	Sturm	ZS16	Sep-18	68	8073	N/K	N/K	N/K	N/A	N/A	N/A	0.1-6.0	Particulate Matter	99+
CU14	Paint Line #3 Booth Filter	--	Sturm	ZS16	Sep-18	82	2679	N/K	N/K	N/K	N/A	N/A	N/A	602 (1.5 bar)	Particulate Matter	99+
CU15	Paint Line #2 Booth Filter	--	Sturm	ZS16	Nov-17	82	2679	N/K	N/K	N/K	N/A	N/A	N/A	602 (1.5 bar)	Particulate Matter	99+
CU17	Paint Line #1 Booth Filter	--	Sturm	ZS16	Mar-17	75	20044	N/K	N/K	N/K	N/A	N/A	N/A	602 (1.5 bar)	Particulate Matter	99+
CU19	Core Silica Sand Silo A Bin Vent Filter	--			Feb-17	68.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99+
CU20	Core Silica Sand Silo B Bin Vent Filter	--			Feb-17	68.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99+

Division for Air Quality

300 Sower Boulevard

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DEP7007GG

Control Equipment

Additional Documentation

___ Complete Sections GG.1 through GG.12, as applicable

___ Attach manufacturer's specifications for each control device

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 4/5/2021

Section GG.1: General Information - Control Equipment

Control Device ID #	Control Device Name	Cost	Manufacturer	Model Name/ Serial #	Date Installed	Inlet Gas Stream Data For All Control Devices					Inlet Gas Stream Data For Condensers, Adsorbers, Afterburners, Incinerators, Oxidizers Only			Equipment Operational Data For All Control Devices		
						Temperature (°F)	Flowrate (scfm @ 68°F)	Average Particle Diameter (μm)	Particle Density (lb/ft^3) or Specific Gravity	Gas Density (lb/ft^3)	Gas Moisture Content (%)	Gas Composition	Fan Type	Pressure Drop Range (in. H_2O)	Pollutants Collected/ Controlled	Pollutant Removal (%)
CU21	Snag Grinder #1 Fabric Filter	-				68		N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0	Particulate Matter	99+
CU22	Snag Grinder #2 Fabric Filter	-				68		N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0	Particulate Matter	99+

Section GG.5: Scrubber

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Scrubber	Identify Type of Scrubber: Venturi, Packed Bed, Spray Tower, or Other (specify)	For Venturi Scrubbers:	For Packed Bed Scrubbers:		For Spray Towers:		Identify Type of Flow: Concurrent, Countercurrent, or Crossflow	Length in Direction of Gas Flow *(ft)*	Cross-Sectional Area *(ft^2)*	Venturi Throat Velocity *(ft/s)*	Mist Eliminator			Scrubbing Liquid			
			Identify Throat Type: Fixed or Adjustable	Identify Packing Type	Packing Height *(in)*	Number of Nozzles	Nozzle Pressure *(psig)*					Identify Type: Mesh or Vane	Cross-Sectional Area *(ft^2)*	Pressure Drop *(in. H_2O)*	Chemical Composition	Flowrate *(gal/min)*	Fresh Liquid Makeup Rate *(gal/min)*	Describe Disposal Method of Scrubber Effluent
CU07	EU39, EU40, EU41, EU42	Packed Bed	NA	VSP 50	157.48	NA	NA	Countercurrent	26.1	48.69	NA	NA	NA	NA	H_2SO_4	176.11	1.76	Auto-discharge into a tote (IBC)

Section GG.6: Filter

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Filter	Identify Type of Filter Unit: Baghouse, Cartridge Collector, or Other (specify)	Identify Type of Filtering Material: Fabric, Paper, Synthetic, or Other (specify)	Total Filter Area (ft^2)	Effective Air-to-Filter Ratio ($acfm/ft^2$)	Continuous Monitoring Instrumentation (e.g. COMS, BLDS, none)	Additional Materials Introduced into the Control System (e.g. lime, carbon)		Identify Cleaning Method: Shaker, Pulse Air, Reverse Air, Pulse Jet, or Other (specify)	Identify Gas Cooling Method: Ductwork, Heat Exchanger, Bleed-in Air, Water Spray, or Other (specify)	For Ductwork:		For Bleed-in Air:	For Water Spray:
							Material	Injection Rate (lb/hr)			Length (ft)	Diameter (ft)	Flowrate (scfm @ 68°F)	Flowrate (gal/min)
CU01	EU01 (secondary), EU05 (sec), EU06(sec), EU07, EU08, EU09, EU10, EU13 (sec), EU16 (sec), EU18 (sec)	Baghouse	Fabric			BLDS Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU02	EU17	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU03	EU19	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU04	EU20	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU05	EU21	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU06	EU22, EU53	Baghouse	Fabric			BLDS Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU08	EU33, EU35A (sec), EU35B (sec), EU36, EU43 (sec), EU44, EU45, EU46, EU47, EU50, EU51, EU52, EU59, EU79 (sec), EU80 (sec), EU81 (sec)	Baghouse	Fabric			BLDS Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU10	EU57	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA

Section GG.6: Filter

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Filter	Identify Type of Filter Unit: Baghouse, Cartridge Collector, or Other (specify)	Identify Type of Filtering Material: Fabric, Paper, Synthetic, or Other (specify)	Total Filter Area (ft^2)	Effective Air-to-Filter Ratio ($acfm/ft^2$)	Continuous Monitoring Instrumentation (e.g. COMS, BLDS, none)	Additional Materials Introduced into the Control System (e.g. lime, carbon)		Identify Cleaning Method: Shaker, Pulse Air, Reverse Air, Pulse Jet, or Other (specify)	Identify Gas Cooling Method: Ductwork, Heat Exchanger, Bleed-in Air, Water Spray, or Other (specify)	For Ductwork:		For Bleed-in Air:	For Water Spray:
							Material	Injection Rate (lb/hr)			Length (ft)	Diameter (ft)	Flowrate ($scfm$ @ 68°F)	Flowrate (gal/min)
CU11	EU60 (sec), EU61, EU62, EU64, EU65, EU77 (sec), EU78 (sec)	Baghouse	Fabric			BLDS	NA	NA	Pulse Jet	Ductwork			NA	NA
CU12	EU63	Bin Vent Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA
CU13 a-h	EU66	Cartridge Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA
CU13 i-j	EU67	Cartridge Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA
CU14	EU68	Paint Booth Filter				Magnahelic	NA	NA	None	NA	NA	NA	NA	NA
CU15	EU69	Paint Booth Filter				Magnahelic	NA	NA	None	NA	NA	NA	NA	NA
CU17	EU66 (sec), EU67 (sec), EU71, EU82 (sec)	Paint Booth Filter				Magnahelic	NA	NA	None	NA	NA	NA	NA	NA
CU19	EU35A	Bin Vent Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA
CU20	EU35B	Bin Vent Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA

Section GG.6: Filter

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Filter	Identify Type of Filter Unit: Baghouse, Cartridge Collector, or Other (specify)	Identify Type of Filtering Material: Fabric, Paper, Synthetic, or Other (specify)	Total Filter Area (ft^2)	Effective Air-to-Filter Ratio ($acfm/ft^2$)	Continuous Monitoring Instrumentation (e.g. COMS, BLDS, none)	Additional Materials Introduced into the Control System (e.g. lime, carbon)		Identify Cleaning Method: Shaker, Pulse Air, Reverse Air, Pulse Jet, or Other (specify)	Identify Gas Cooling Method: Ductwork, Heat Exchanger, Bleed-in Air, Water Spray, or Other (specify)	For Ductwork:		For Bleed-in Air:	For Water Spray:
							Material	Injection Rate (lb/hr)			Length (ft)	Diameter (ft)	Flowrate (scfm @ 68°F)	Flowrate (gal/min)
CU21	EU77	Fabric Filter	Fabric	NK	NK	None	NA	NA	N/A	NA	-	-	NA	NA
CU22	EU78	Fabric Filter	Fabric	NK	NK	None	NA	NA	N/A	NA	-	-	NA	NA

Section GG.12: Notes, Comments, and Explanations

Division for Air Quality

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU01	Charge Handling	EU01	Charge Handling	Melt Baghouse	CU01	ST02	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	99.5+% est. (see calcs for gr/dscf)	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application
EU05	Refractory Burner #1	EU05	Refractory Burner #1	Melt Baghouse	CU01	ST02	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	99.5+% est. (see calcs for gr/dscf)	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application
EU06	Refractory Burner #2	EU06	Refractory Burner #2	Melt Baghouse	CU01	ST02	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	99.5+% est. (see calcs for gr/dscf)	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application
EU07	Induction Furnace #1	EU07	Induction Furnace #1	Melt Baghouse	CU01	ST02	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	99.5+% est. (see calcs for gr/dscf)	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application
EU08	Induction Furnace #2	EU08	Induction Furnace #2	Melt Baghouse	CU01	ST02	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	99.5+% est. (see calcs for gr/dscf)	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application
EU09	Induction Furnace #3	EU09	Induction Furnace #3	Melt Baghouse	CU01	ST02	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	99.5+% est. (see calcs for gr/dscf)	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application
EU10	Induction Furnace #4	EU10	Induction Furnace #4	Melt Baghouse	CU01	ST02	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	99.5+% est. (see calcs for gr/dscf)	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application

Division for Air Quality

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU13	Hot Metal Transfer	EU13	Hot Metal Transfer	Melt Baghouse	CU01	ST02	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	99.5+% est. (see calcs for gr/dscf)	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application
EU15	Pouring Furnace #1	EU15	Pouring Furnace #1	Melt Baghouse	CU01	ST02	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	99.5+% est. (see calcs for gr/dscf)	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application
EU16	Pouring Furnace #2	EU16	Pouring Furnace #2	Melt Baghouse	CU01	ST02	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	99.5+% est. (see calcs for gr/dscf)	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application	See emission calcs attached to permit application
EU17	Melt and Core/Mold Baghouse Waste Dust Silo	EU17	Melt and Core/Mold Baghouse Waste Dust Silo	Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent	CU02	ST03	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU18	Refractory Curing Mobile Burner	EU18	Refractory Curing Mobile Burner	Melt Baghouse	CU01	ST02	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU19	Mold Silica Sand Silo	EU19	Mold Silica Sand Silo	Mold Silica Sand Silo Bin Vent Filter	CU03	ST04	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU20	Blend Silo	EU20	Blend Silo	Blend Silo Bin Vent	CU04	ST05	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU21	Bentonite Silo	EU21	Bentonite Silo	Bentonite Silo Bin Vent	CU05	ST06	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU22	Mold Sand Handling and Preparation	EU22	Mold Sand Handling and Preparation	Bentonite Silo Bin Vent	CU01	ST02	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU33	Mold Making #1	EU33	Mold Making #1	Core/Mold Baghouse	CU08	ST09	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU34	Mold Making #2	EU34	Mold Making #2	Core/Mold Baghouse	CU08	ST09	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU35A	Core Silica Sand Silo A	EU35A	Core Silica Sand Silo A	Core Silia Sand Silo A Bin Vent Filter	CU18	ST09	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU35B	Core Silica Sand Silo B	EU35B	Core Silica Sand Silo B	Core Silia Sand Silo B Bin Vent Filter	CU19	ST09	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU36	Core Sand Handling and Preparation	EU36	Core Sand Handling and Preparation	Core/Mold Baghouse	CU08	ST09	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU39	PUCB Core Machine #1	EU39	PUCB Core Machine #1	Sulfuric Acid Scrubber	CU07	ST08	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU40	PUCB Core Machine #2	EU40	PUCB Core Machine #2	Sulfuric Acid Scrubber	CU07	ST08	3.7									

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Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU41	PUCB Core Machine #3	EU41	PUCB Core Machine #3	Sulfuric Acid Scrubber	CU07	ST08	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU42	PUCB Core Machine #4	EU42	PUCB Core Machine #4	Sulfuric Acid Scrubber	CU07	ST08	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU43	Core Wash Station #1	EU43	Core Wash Station #1	Core/Mold Baghouse	CU08	ST09		See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU44	Core Dryer #1	EU44	Core Dryer #1	Core/Mold Baghouse	CU08	ST09	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU45	Core Dryer #2	EU45	Core Dryer #2	Core/Mold Baghouse	CU08	ST09	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU46	Core Dryer #3	EU46	Core Dryer #3	Core/Mold Baghouse	CU08	ST09	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU47	Core Dryer #4	EU47	Core Dryer #4	Core/Mold Baghouse	CU08	ST09	3.7	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU50	Pouring #1	EU50	Pouring #1	Core/Mold Baghouse	CU08	ST09	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
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Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU51	Pouring #2	EU51	Pouring #2	Core/Mold Baghouse	CU08	ST09	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU52	Mold Cooling	EU52	Mold Cooling	Core/Mold Baghouse	CU08	ST09	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU53	Shakeout Conveyor	EU53	Shakeout Conveyor	Core/Mold Baghouse	CU06	ST07	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU54	Sand Cooler	EU54	Sand Cooler	Sand Plant Baghouse	CU06	ST07	194	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU55	Used Mold and Core Sand Storage	EU55	Used Mold and Core Sand Storage	Sand Plant Baghouse	CU06	ST07	194	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU56	Sand Screening	EU56	Sand Screening	Sand Plant Baghouse	CU06	ST07	202	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU57	Sand Plant Waste Sand Silo	EU57	Sand Plant Waste Sand Silo	Sand Plant Waste Sand Silo Bin Vent Filter	CU10	ST11	202	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU59	Casting Cooling	EU59	Casting Cooling	Core/Mold Baghouse	CU08	ST09	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU60	Sorting Conveyor	EU60	Sorting Conveyor	Fettling Baghouse	CU11	ST12	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
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Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU61	Steel Shot Blasting #1	EU61	Steel Shot Blasting #1	Fettling Baghouse	CU11	ST12	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU62	Steel Shot Blasting #2	EU62	Steel Shot Blasting #2	Fettling Baghouse	CU11	ST12	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU63	Fettling Baghouse Waste Dust Silo	EU63	Fettling Baghouse Waste Dust Silo	Fettling Baghouse Wast Dust Silo Bin Vent Filter	CU12	ST13	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU64	Grinding #1	EU64	Grinding #1	Fettling Baghouse	CU11	ST12	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU65	Grinding #2	EU65	Grinding #2	Fettling Baghouse	CU11	ST12	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU66	Turning Lathes (8)	EU66	Turning Lathes (8)	Cartridge Filters CU13a - 13h	CU13a-CU13h	ST15c	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU67	Drilling and Milling (2)	EU67	Drilling and Milling (2)	Cartridge Filters CU13i - 13j	CU13i-cu13j	ST15c	25.3	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU68	Paint Booth #1	EU68	Paint Line #3	Paint Line #3 Booth Filter	CU14	ST15a	28.9	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU69	Paint Booth #2	EU69	Paint Booth #2	Paint Line #4 Booth Filter	CU15	ST15b	28.9	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

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Source Emissions Profile

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Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU71	Paint Line #1	EU71	Paint Line #1	Paint Line #1 Booth Filter	CU17	ST16	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU72	Emergency Generator #1	EU72	Emergency Generator #1	N/A	N/A	STG1	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU73	Emergency Generator #2	EU73	Emergency Generator #2	N/A	N/A	STG2	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU74	Emergency Generator #3	EU74	Emergency Generator #3	N/A	N/A	STG3	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU75	Diesel Storage Tank	EU75	Diesel Storage Tank	N/A	N/A	STTK1	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU76	Paved Roadways	EU76	Paved Roadways	N/A	N/A	FUG	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU77	Snag Grinder #1	EU77	Snag Grinder #1	Snag Grinder #1 Fabric Filter	CU21	ST12	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU78	Snag Grinder #2	EU78	Snag Grinder #2	Snag Grinder #2 Fabric Filter	CU22	ST12	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	99.5+% est. (see calcs for gr/dscf)	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU79	Core Wash Station #2	EU79	Core Wash Station #2	N/A	N/A	ST09	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU80	Core Wash Station #3	EU80	Core Wash Station #3	N/A	N/A	ST09	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

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Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU81	Core Wash Station #4	EU81	Core Wash Station #4	N/A	N/A	ST09	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification
EU82	Rust Preventatitive Application	EU82	Rust Preventatitive Application	N/A	N/A	ST16	See emission calcs attached to permit application	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	N/A	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification	See revised calcs to be submitted with permit modification

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
ST02	Control Device ID: CU01 Emission Unit IDs: EU01, EU02, EU04,EU05, EU06, EU07, EU08, EU09,EU10	8.53	114.8	0	4072425	539906	176,538	104	51.5

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
ST02	Control Device ID: CU01 Emission Unit ID(s): EU11, EU12, EU13,EU14, EU15, EU16, EU18	8.5	114.8	0	4072425	539906	176,538	104	51.5
ST03	Control Device ID: CU02 Emission Unit ID(s): EU17	1	72.2	0	4072413	539903	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter
ST04	Control Device ID: CU03 Emission Unit ID(s): EU19	1	72.2	0	4072404	539904	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter
ST05	Control Device ID: CU04 Emission Unit ID(s): EU20	1	72.2	0	4072407	539906	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
ST06	Control Device ID: CU05 Emission Unit ID(s): EU21	1	72.2	0	4072411	539908	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter
ST07	Control Device ID: CU06 Emission Unit ID(s): EU22, EU23, EU24, EU26, EU27, EU28, EU29, EU30	6.6	131.2	0	4072396	539888	105,923	95	52.2

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
ST07	Control Device ID: CU06 Emission Unit ID(s): EU31, EU32	6.6	131.2	0	4072396	539888	105,923	95	52.2
ST08	Control Device ID: CU07 Emission Unit ID(s): EU39, EU40	2.8	85.3	0	4072517	539822	23,539	104	64.2
ST09	Control Device ID: CU08 Emission Unit ID(s): EU33, EU34, EU35A (via CU19), EU35B (via CU20), EU36-EU38	8.2	141.1	0	4072488	539816	176539	132	55.7

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
ST08	Control Device ID: CU07 Emission Unit ID(s): EU41, EU42	2.8	85.3	0	4072517	539822	23,539	104	64.2
ST09	Control Device ID: CU08 Emission Unit ID(s): EU43-EU50	8.2	141.1	0	4072488	539816	176539	132	55.7

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
ST07	Control Device ID: CU06 Emission Unit ID(s): EU53, EU54, EU55, EU56	6.6	131.2	0	4072396	539888	105,923	95	52.2
ST09	Control Device ID: CU08 Emission Unit ID(s): EU51, EU52, EU59	8.2	141.1	0	4072488	539816	176539	132	55.7
ST10	Control Device ID: CU09 Emission Unit ID(s): EU58	-	-	-	-	-	-	-	-
ST11	Control Device ID: CU10 Emission Unit ID(s): EU57	1	72.2	0	4072410	539901	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter
ST12	Control Device ID: CU11 Emission Unit ID(s): EU60	5.25	98.4	0	4072331	539832	64731	68	49.9

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
ST12	Control Device ID: CU11 Emission Unit ID(s): EU60, EU61, EU62, EU64, EU65	3.2	85.3	0	4072517	539822	105,944	68	52.22
ST13	Control Device ID: CU12 Emission Unit ID(s): EU63	6.5	141.1	0	4072488	539816	176573	132	55.7
ST15a	Control Device ID: CU14 Emission Unit ID(s): EU68	1.1	46.6	0	4072447	539710	2718	113	49.2
ST15b	Control Device ID: CU15 Emission Unit ID(s): EU69	1.1	46.6	0	4072435	539710	2718	113	49.2
ST15d	Control Device ID: CU16 Emission Unit ID(s): EU70	-	-	-	-	-	-	-	-
ST16	Control Device ID: CU17 Emission Unit ID(s): EU66, EU67, EU71, EU82, EU84	1.1	46.6	0	4072424	539704	2718	113	49.2

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
STG1	Control Device ID: None Emission Unit ID(s): EU72	-	-	-	-	-	-	-	-
STG2	Control Device ID: None Emission Unit ID(s): EU73	-	-	-	-	-	-	-	-
STG3	Control Device ID: None Emission Unit ID(s): EU74	-	-	-	-	-	-	-	-
STTK-1	Control Device ID: None Emission Unit ID(s): EU76	-	-	-	-	-	-	-	-
ST12	Control Device ID: CU21 Emission Unit ID(s): EU78	5.25	98.4	0	4072331	539832	64731	68	49.9
ST12	Control Device ID: CU22 Emission Unit ID(s): EU79	5.25	98.4	0	4072331	539832	64731	68	49.9

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU01	Charge Handling	EU01	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU02	Alloy Storage	EU02	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU03	Scrap Drying	EU03	-	-	-	-	-	-
EU04	Scrap Cleaning	EU04	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU05	Ladle Preheater #1	EU05	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU06	Ladle Preheater #2	EU06	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU07	Induction Furnace #1	EU07	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU08	Induction Furnace #2	EU08	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU09	Induction Furnace #3	EU09	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU10	Induction Furnace #4	EU10	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
#REF!	#REF!	#REF!	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
#REF!	#REF!	#REF!	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
#REF!	#REF!	#REF!	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
#REF!	#REF!	#REF!	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU15	Pouring Furnace #1	EU15	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU16	Pouring Furnace #2	EU16	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU17	Melt and Core/Mold Baghouse Waste Dust Silo	EU17	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU18	Refractory Curing Mobile Burner	EU18	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU19	Mold Silica Sand Silo	EU19	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU20	Blend Silo	EU20	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU21	Bentonite Silo	EU21	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU22	Mold Sand Handling and Preparation	EU22	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
			Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU33	Mold Making #1	EU33	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU34	Mold Making #2	EU34	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU35A	Core Silica Sand Silo A	EU35A	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU35B	Core Silica Sand Silo B	EU35B	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU36	Core Sand Handling and Preparation	EU36	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU39	PUCB Core Machine #1	EU39	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU40	PUCB Core Machine #2	EU40	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU41	PUCB Core Machine #3	EU41	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU42	PUCB Core Machine #4	EU42	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU43	Core Wash Station #1	EU43	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU44	Core Dryer #1	EU44	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU45	Core Dryer #2	EU45	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU46	Core Dryer #3	EU46	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU47	Core Dryer #4	EU47	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU51	Pouring #2	EU51	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU52	Mold Cooling	EU52	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU53	Shakeout Conveyor	EU53	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU54	Sand Cooler	EU54	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU55	Used Mold and Core Sand Storage	EU55	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU56	Sand Screening	EU56	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU57	Sand Plant Waste Sand Silo	EU57	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU59	Casting Cooling	EU59	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU61	Steel Shot Blasting #1	EU61	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU62	Steel Shot Blasting #2	EU62	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU63	Fettling Baghouse Waste Dust Silo	EU63	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU64	Grinding #1	EU64	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU65	Grinding #2	EU65	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU66	Turning Lathes (8)	EU66	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU67	Drilling and Milling (2)	EU67	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU68	Paint Booth #1	EU68	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU69	Paint Booth #2	EU69	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
0	0	0	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU71	Paint Line #1	EU71	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU72	Emergency Generator #1	EU72	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU73	Emergency Generator #2	EU73	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU74	Emergency Generator #3	EU74	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU75	Diesel Storage Tank	EU75	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU76	Paved Roadways	EU76	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU77	Snag Grinder #1	EU77	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.
EU78	Snag Grinder #2	EU78	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.4: Notes, Comments, and Explanations
EU01: Combine EU01 and EU02 as SCC includes all charge handling activites
EU01: Change name from Scrap Steel Storage to Change Handling to match SCC and industry norms
EU01: APCD CU01 added to address secondary capture of emissions
EU03 and EU04: Not installed at this time
EU05: Change name from Refractory Burner #1 to Ladle Preheater #1 to better identify emission unit
EU06: Change name from Refractory Burner #2 to Ladle Preheater #2 to better identify emission unit
EU05 and EU06: APCD CU01 added to address secondary capture of emissions

Section N.4: Notes, Comments, and Explanations
EU11-EU16: Change operating limit to 91,586 tpy; incorrect assumption to split 50:50
EU11, EU12 and EU15: Not installed at this time
EU11-EU16: Change maximum hourly capacity as 25.3 tph for each group; incorrect assumption to split 50:50
EU13 and EU14: Combine to a single EU ID EU13 and name "Molten Metal Transfer"
EU17: Change description from "Melt Shop Baghouse Waste Dust Silo" to "Core/Mold Baghouse Waste Dust Silo"
EU19: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU20: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU13, EU14, EU18: Added Control Device ID CU01 as secondary capture

Section N.4: Notes, Comments, and Explanations
EU21: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity.
EU21 - EU30: Combine into a single emission unit described as "Moldmaking and Sand Handling" with Emission Unit ID EU21 to match SCC description

Section N.4: Notes, Comments, and Explanations
EU31 thru EU34: Combine into a single emission unit identied as "Moldmaking and Sand Preparation (EU21)"
EU33-EU34: Change maximum hourly capacity as 197 tph for the group; incorrect assumption to split 50:50
EU35A: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU35B: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU35A and EU35B: Bin Vents (CU18 and CU19) vent inside with secondary capture via CU08 through stack ST09
EU34: Not installed at this time

Section N.4: Notes, Comments, and Explanations
EU48 thru EU49: Combine into a single emission unit identied as "Moldmaking and Sand Preparation (EU21)"
EU50-EU51: Change maximum hourly capacity to 25.3 tph for group; incorrect assumption to split 50:50
EU41, EU42,EU46, EU47, EU49: Not installed at this time

Section N.4: Notes, Comments, and Explanations
EU50-EU51: Change maximum hourly capacity to 25.3 tph for group; incorrect assumption to split 50:50
EU51 and EU58: Not installed at this time

Section N.4: Notes, Comments, and Explanations
EU61 and EU62: To match SCC, remove shot maximum hourly capacity and replace with metal hourly capacity for the group
EU64: Change name for Grinding #1 to Autogrinder #1, replace capacity with metal hourly capacity for the group
EU65: Change name for Grinding #2 to Autogrinder #2, replace capacity with metal hourly capacity for the group
EU66 and EU67: Combine and describe as "Machining " and identify as EU66
EU66-EU67: Cartridge Filters (CU13a-j) vent inside with secondary capture via Paint Line Fabric Filter stack ST15c
EU68: Change name to Paint Line #3
EU62, EU65 and E70: Emission Unit is not installed
EU69: Change name to Paint Line #2
EU71: Change name to Paint Line #1

Section N.4: Notes, Comments, and Explanations
EU75: Gasoline tank is not installed
EU77 - Change Paved Roadways from EU76 to EU77 as EU76 is already identified as the ID for the diesel storage tank.

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DEP7007DD

Insignificant Activities

___ Section DD.1: Table of Insignificant Activities
___ Section DD.2: Signature Block
___ Section DD.3: Notes, Comments, and Explanations

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 11/30/2021

Section DD.1: Table of Insignificant Activities

*Identify each activity with a unique Insignificant Activity number (IA #); for example: 1, 2, 3... etc.

Insignificant Activity #	Description of Activity including Rated Capacity	Serial Number or Other Unique Identifier	Applicable Regulation(s)	Calculated Emissions
None				

Section DD.2: Signature Block

I, THE UNDERSIGNED, HEREBY CERTIFY UNDER PENALTY OF LAW, THAT I AM A RESPONSIBLE OFFICIAL, AND THAT I HAVE PERSONALLY EXAMINED, AND AM FAMILIAR WITH, THE INFORMATION SUBMITTED IN THIS DOCUMENT AND ALL ITS ATTACHMENTS. BASED ON MY INQUIRY OF THOSE INDIVIDUALS WITH PRIMARY RESPONSIBILITY FOR OBTAINING THE INFORMATION, I CERTIFY THAT THE INFORMATION IS ON KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE OR INCOMPLETE INFORMATION, INCLUDING THE POSSIBILITY OF FINE OR IMPRISONMENT.

By:

Authorized Signature	Date
Darryl Konsler	CEO
Type/Print Name of Siguatory	Title of Siguatory

Section DD.3: Notes, Comments, and Explanations

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DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirements
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation
___ Complete DEP7007AI

Source Name: **Fritz Winter North America, LP**
KY EIS (AFS) #: **21-213-00064**
Permit #: **V-16-022 R1**
Agency Interest (AI) ID: **129745**
Date: **12/15/2021**

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
See Air	Permit Identified	Above					

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing

Section V.6: Notes, Comments, and Explanations

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DEP7007AA

Compliance Schedule for Noncomplying Emission Units

___ Section AA.1: Emission Unit Description
___ Section AA.2: Listing of Applicable Requirements
___ Section AA.3: Intermediate Checkpoints
___ Section AA.4: Notes, Comments, and Explanations

Additional Documentation

__ Attach a flow diagram

__ Complete DEP7007AI

Source Name: **Fritz Winter North America, LP**
KY EIS (AFS) #: **21- 213-00064**
Permit #: **V-16-022 R1**
Agency Interest (AI) ID: **129745**
Date: **12/31/2021**

Section AA.1: Emission Unit Description

Emission Unit #: Identified in Agreed Order
Emission Unit Name: Identified in Agreed Order
Construction Date: Identified elsewhere
Description:
(Attach flow diagram)
See Figures 2-1 through 2-7

Section AA.2: Listing of Applicable Requirements

List applicable requirements with which the emission unit does not comply.

	Applicable Requirement	Applicable Regulation	Effective Compliance Date
a)	See Agreed Order and Supporting Documents		
b)			
c)			
d)			
e)			

Detailed Description of Methods Used to Achieve Compliance	
a)	
b)	
c)	
d)	
e)	

Section AA.3: Intermediate Checkpoints

For a requirement with which the source is not in compliance, list remedial measures leading to compliance, including checkpoints and scheduled completion dates.

Checkpoint(s)	Scheduled Completion Date
Preliminary evaluation of process change completed.	Subsequent issued air permit will resolve any deficiency
Binding agreement entered into to alter emission unit.	See Agreed Order
Permit application submitted for construction of air pollution control equipment for this emission unit or equipment to replace this emission unit.	N/A
New equipment delivered to the source.	N/A
If present equipment was altered, date alteration began.	N/A
Construction of new equipment completed.	N/A
Alteration of existing equipment completed.	N/A
Emission unit tested to demonstrate compliance with the applicable requirements.	
Other (Describe): N/A	
Other (Describe):	
Other (Describe):	
Equipment fully operational and in full compliance.	

State the means used to demonstrate overall compliance.	Any requested compliance demonstration as a results of revised air permit issuance.

Section AA.4: Notes, Comments, and Explanations

Appendix S
Emission Estimation Supporting Information

1. CERP Test Report 1409-123-EQ
2. CERP Test Report 1256-1311-DQ
3. Email - ASK Focus I/II Pouring, Cooling and Shakeout Emission Factors
4. Table – Rust Preventative (Rustillo 4175) Evaporation Study
5. Baghouse Dust Metals Analysis Results

Casting Emission Reduction Program

Prepared by:

TECHNIKON LLC

5301 Price Avenue ▼ McClellan, CA, 95652 ▼ (916) 929-8001

www.technikonllc.com

US Army Contract DAAE30-02-C-1095
FY2002 Tasks

Core Room Baseline

Technikon # 1409-123-EQ

Originally Published
9 December 2002
This document has been revised for public distribution.

EPA United States Environmental Protection Agency

CISA

AFS AMERICAN FOUNDRY SOCIETY, INC.

UNITED STATES COUNCIL FOR AUTOMOTIVE RESEARCH

USCAR

DAIMLERCHRYSLER Ford Motor Company General Motors

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Baseline: Core Room Emissions
Sand Mixing Core Making, Core Storage

1409-123 Test EQ

This report has been reviewed for completeness and accuracy and approved for release by the following:

Senior Staff Engineer:	// *Original Signed* //	
	Bret McComb	Date
Process Engineering Manager:	// *Original Signed* //	
	Steven Knight	Date
VP Measurement Technologies:	// *Original Signed* //	
	Clifford Glowacki, CIH	Date
VP Operations:	// *Original Signed* //	
	George Crandell	Date
President:	// *Original Signed* //	
	William Walden	Date

The data contained in this report were developed to provide baseline data for assessing the relative emissions profile of product or process as submitted for evaluation. You may not obtain the same results in your facility. Data was not collected to assess casting quality, cost, or producability.

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Executive Summary

This report contains the results of VOC emission testing during phenolic urethane Cold Box core making. All testing was conducted in the Technikon, LLC Production foundry core making facility.

The test was divided into three segments, core mixing, core blowing, and core storage. Core mixing was performed using a Redford/Carver 50 pound core sand mixer. During the core-blowing portion of the test, the gassing and purge emissions and the "fugitive" emissions were measured together. The storage emissions represent the VOCs released to the environment from the time of core removal from the core box until the core is used to produce a casting. For this study, a five (5) hour storage time was established. All components of mold making were conducted within enclosures meeting the criteria for a temporary total enclosure (TTE) as specified in US EPA Method 204.

Each test segment consisted of nine (9) replicate runs. Samples were collected on sorbent tubes during each run for selected VOCs and HAPs for subsequent laboratory analysis in accordance with US-EPA Method 18. All sampling locations were consistent with US EPA Method 1 except for core storage. The storage segment of the test used a laminar flow-through enclosure to sweep all of the emissions to the Method 18 sampling manifold. US EPA Method 25A, Total Gaseous Organic Concentration (TGOC), was used to monitor all segments of the test.

The table below summarizes the results for each of the test segments in lbs/lb of binder.

Analyte	Mixing	Gas/Purge Fugitives	Storage	Total
TGOC as Propane	0.0041	NA	NA	NA
HC as Hexane	0.0021	0.0752	0.0171	0.0944
Sum of VOCs	0.0001	0.0014	0.0008	0.0023
Sum of HAPs	0.0001	0.0014	0.0008	0.0023
Sum of POMs	ND	0.0010	0.0007	0.0017

NA: Not Applicable. **TGOC**: measures all carbon-containing organic compounds. The predominant organic in these test-segments was the triethylamine catalyst which was not a target analyte.

It must be noted that the reference testing performed is not suitable for use as emission factors or for purposes other than evaluating the relative emission reductions associated with the use of alternative materials, equipment, or processes. The emissions measurements are unique to the specific castings produced, materials used, and testing methodology associated with these tests, and should not be used as the basis for estimating emissions from actual commercial foundry applications.

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1.0 Introduction

1.1 Background

Technikon LLC is a privately held contract research organization located in McClellan, California, a suburb of Sacramento. Technikon offers emissions research services to industrial and government clients specializing in the metal casting and mobile emissions areas. Technikon operates the Casting Emission Reduction Program (CERP). CERP is a cooperative initiative between the Department of Defense (US Army) and the United States Council for Automotive Research (USCAR). Its purpose is to evaluate alternative casting materials and processes that are designed to reduce air emissions and/or produce more efficient casting processes. Other technical partners directly supporting the project include: the American Foundry Society (AFS); the Casting Industry Suppliers Association (CISA); the US Environmental Protection Agency (USEPA); and the California Air Resources Board (CARB).

1.2 Technikon Objectives

The primary objective of Technikon is to evaluate materials, equipment, and processes used in the production of metal castings. Technikon's facility was designed to evaluate alternate materials and production processes designed to achieve significant air emission reductions, especially for the 1990 Clean Air Act Amendment. The facility has two principal testing arenas: a Pre-Production Foundry designed to measure airborne emissions from individually poured molds, and a Production Foundry designed to measure air emissions in a continuous full scale production process. Each of these testing arenas has been specially designed to facilitate the collection and evaluation of airborne emissions and associated process data.

The Production Foundry provides simultaneous detailed individual emission measurements using methods based on USEPA protocols for the melting, pouring, sand preparation, mold making, and core making processes. The core making area of the Production foundry contains three core blowers, a Georg Fischer for the preparation of automotive block cores, a Redford that is used for the production of step cores, and a second smaller Redford to produce dogbone tensile test specimens.

It must be noted that the results from the reference and product testing performed are not suitable for use as emission factors or for other purposes other than evaluating the relative emission reductions associated with the use of alternative materials, equipment, or manufacturing processes. The emissions measurements are unique to the specific castings produced, materials used, and testing methodology associated with these tests. These measurements should not be used as the basis for estimating emissions from actual commercial foundry applications.

1.3 Report Organization

This report has been designed to document the methodology and results of a specific test plan that was used to evaluate VOC emissions from the ISOCURE® core making process. Section 2 of this report includes a summary of the methodologies used for data collection and analysis,

emission calculations, QA/QC procedures, and data management and reduction methods. Specific data collected during this test are summarized in Section 3 of this report, with detailed data included in Appendix B of this report. Section 4 of this report contains a discussion of the results, and Section 5 contains recommendations for further testing.

The raw data for this test series are included in a folder that is maintained at the Technikon facility.

1.4 Specific Test Plan and Objectives

This report contains the results of testing performed to provide data on selected VOC emissions from the core making process. Table 1-1 provides a summary of the test plan for the mixing, core making, and storage phase. The details of the approved test plan are included in Appendix A.

Table 1-1 Test Plan Summary

	Test Plan
Type of Process tested	Core Making Emissions Study
Test Plan Number	1409-123
Binder System	Ashland ISOCURE® 305/904
Number of tests	9 each at core blowing, core mixing, and core storage
Test Date	8/19/02 > 9/13/02
Emissions Measured	TGOC as Propane, HC as Hexane, o-Cresol, Phenol, Formaldehyde, Naphthalene, 1-Me Naphthalene, 2-Me Naphthalene
Process Parameters Measured	Sand, and Binder Weights, Incoming Sand Temperature, Sand Mixing Time, Core Machine Cycle Time
Source Parameters Measured	Exhaust Duct Temperature, Pressure, and Volumetric Flow Rate

2.0 Test Methodology

2.1 Description of Process and Testing Equipment

Figure 2-1 is a diagram of the core making process and testing equipment.

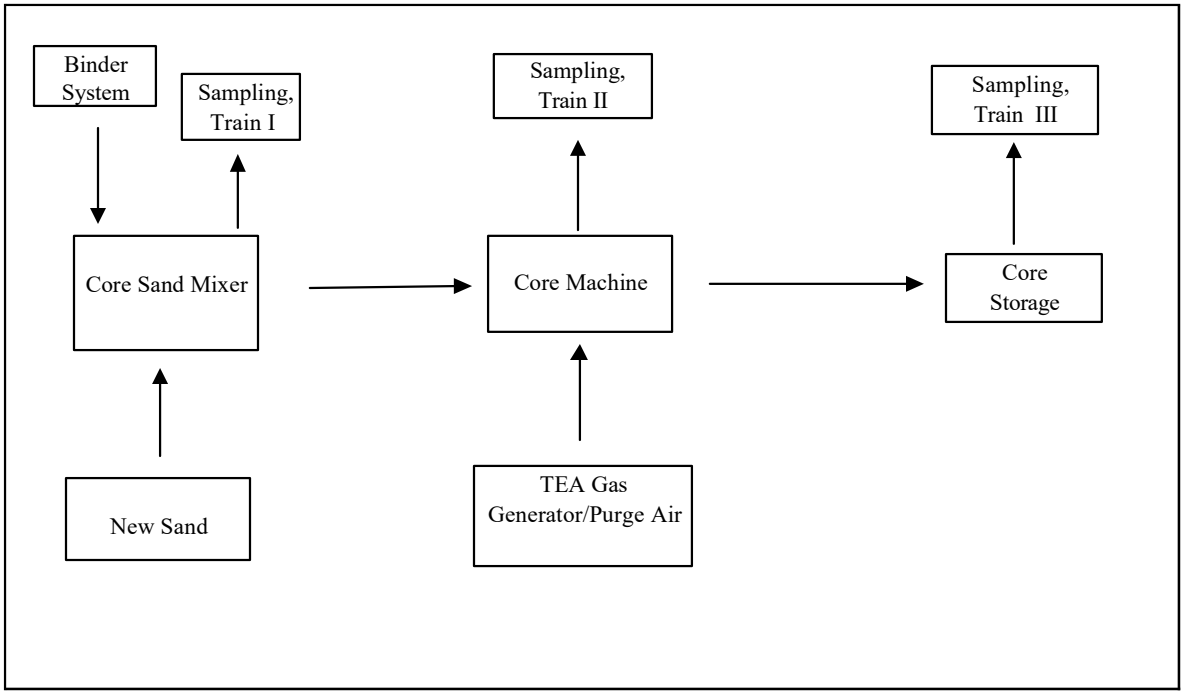


Figure 2-1 Core Making and Testing Process

2.2 Description of Testing Program

The specific steps used in this sampling program are summarized below:

1. **Test Plan Review and Approval:** The proposed test plan was reviewed by the Technikon staff and the CERP Steering Committee, and approved.

2. **Core Preparation**: Step cores were prepared for this test in the Production foundry core room area. The sand and binder were mixed in a Paddle Wheeled Sand Mixer, and then introduced (blown) into the core tooling of the Redford-Carver core machine. The core-making machine was contained in a permanent total enclosures meeting US EPA Method 204 criteria. A weighed amount of the catalyst triethylamine (TEA) gas was heated to 84°F and allowed to expand into the sand in the core box to cure the core. Finally, purge air, heated to 80°F, was blown through the sand mixture in the core box. All these gases

are exhausted to a wet gas scrubber charged with sulfuric acid at pH 4 or less. Step cores are fabricated in a single cavity core box. One blow produces a single step core.

3. **Individual Sampling Events:** Sampling to determine the core making emissions consisted of three (3) segments. The mixing emissions were collected from a Paddle Wheeled 50 pound core sand mixer for seven (7) minutes. The mixed sand was dumped into the Redford Carver sand storage hopper. Air samples were collected during the seven (7) minute mix cycle prior to dumping. During the production of step cores, air sample were also collected to determine the amount of solvents being vented off the core process. The samples were collected during each of the nine (9) thirty (30) minute runs that comprised this portion of the test. The storage segment of the test consisted of placing four (4) cores in the flow-through storage enclosures as soon as they were removed from the core machine. The storage enclosures were sealed and sampling begun. A five (5) hour integrated sample was collected. All of the enclosures used during this test meet or exceed US-EPA Method 204 criteria for Temporary Total Enclosures.

Sand Mixing

Core Making

Core Storage

4. **Process Parameter Measurements:** Table 2-1 lists the process parameters that are monitored during each test. The analytical equipment and methods used are also listed.

Table 2-1 Process Parameters Measured

Parameter	Analytical Equipment and Methods
Binder Weight	Mettler PJ8000 Digital Scale (Gravimetric)
Core Sand Weight	Simpson IQ-800-3A Digital Scale

5. **Air Emissions Analysis:** The specific sampling and analytical methods used in the core sand mixing, making, and core storage tests are based on the USEPA reference methods shown in Table 2-2. The details of the specific testing procedures and their variance from the reference methods, if any, are included in the Technikon Standard Operating Procedures.

Table 2-2 Sampling and Analytical Methods

Measurement Parameter	Test Method*
Port location	EPA Method 1
Number of traverse points	EPA Method 1
Gas velocity and temperature	EPA Method 2
HC as Hexane Benzene, Naphthalene, Formaldehyde, o-Cresol, Phenol,	EPA Method 18, NIOSH 1500, NIOSH 2002, TO-11
TGOC (THC) as Propane concentration	EPA Method 25A
Volatile Matter content	EPA Method 24

* These methods were specifically modified to meet the testing objectives of the CERP Program.

6. **Data Reduction, Tabulation and Preliminary Report Preparation:** The analytical results of the emissions tests provide the mass of each analyte in the sample. For the core-blowing segment of the test, the total mass of the analyte emitted is calculated by multiplying the mass of analyte in the sample times the ratio of the sample volume to the total stack gas volume during the test. The total stack gas volume is calculated from the measured stack gas velocity and duct diameter. The total mass of analyte is then divided by the weight of the binder used to provide emissions data in pounds of analyte per pound of binder.

In the case of the storage segment of this test, the stack parameters are replaced by the total volume of gas flowing through the storage enclosure during each sampling period. The total flow rate through the enclosure was controlled with critical orifices. The total mass of the analyte emitted is then calculated by multiplying the measured mass of analyte in the sample times the ratio of sample volume to total gas volume over the same time period.

7. **Report Preparation and Review:** The Preliminary Draft Report is reviewed by the Process Team and Emissions Team to ensure its completeness, consistency with the test plan, and adherence to the prescribed QA/QC procedures. Appropriate observations, conclusions and recommendations are added to the report to produce a Draft Report. The Draft Report is reviewed by the Vice President-Measurement Technologies, the Vice President-Operations. Comments are incorporated into a Final Report prior to final signature approval and distribution.

2.3 Quality Assurance and Quality Control (QA/QC) Procedures

Detailed QA/QC and data validation procedures for the process parameters, stack measurements, and laboratory analytical procedures are included in the Technikon Standard Operating Procedures. In order to ensure the timely review of critical quality control parameters, the following procedures are followed:

~ Immediately following the individual sampling events performed for each test, specific process parameters are reviewed by the Manager - Process Engineering to ensure that the parameters are maintained within the prescribed control ranges. Where data are not within the prescribed ranges, the Manager - Process Engineering and the Vice President-Operations determine whether the individual test samples should be invalidated or flagged for further analysis following review of the laboratory data.

~ The source (stack) and sampling parameters, analytical results and corresponding laboratory QA/QC data are reviewed by the Emissions Measurement Team to confirm the validity of the data. The VP-Measurement Technologies reviews and approves the recommendation, if any, that individual sample data should be invalidated. Invalidated data are not used in subsequent calculations.

3.0 Test Results

The average emission results, in pounds per pound of binder used, are presented in Table 3-1.

The average emission results, in pounds per ton of sand used, are presented in Table 3-2.

The amount of available VOCs for this binder system was determined using a method based on US EPA Method 24 and found to be 0.33 pounds per pound of binder or 33% of the binder weight. This data is presented in Table 3-3

Table 3-4 contains average test process and source data. The total binder weight and the total core weight were calculated from the total amount of sand and the percent binder used in each section of the test.

Appendix B contains the detailed emissions and process data.

Figure 3-1 shows the data from Table 3-1 while Figure 3-2 shows the data from Table 3-2.

Table 3-1 Average Emission Results – Lb/Lb Binder

Core Mixing

Analytes	Average	STDEV
TGOC as Propane	0.0041	<0.0001
HC as Hexane	0.0021	<0.0003
Sum of VOCs	<0.0001	<0.0001
Sum of HAPs	<0.0001	<0.0001
Sum of POMs	ND	NA
Individual Organic HAPs and VOCs		
Phenol	<0.0001	<0.0001
Formaldehyde	<0.0001	<0.0001
o-Cresol	ND	NA
1-Methylnaphthalene	ND	NA
2-Methylnaphthalene	ND	NA
Naphthalene	ND	NA

ND = Not Detected: **NA** = Not Applicable

Table 3-1 Average Emission Results – Lb/Lb Binder (continued)

Core Making

Analytes	Average	STDEV
HC as Hexane	0.0752	0.0051
Sum of VOCs	0.0014	<0.0002
Sum of HAPs	0.0014	<0.0002
Sum of POMs	0.0010	<0.0002
Individual Organic HAPs and VOCs		
2-Methylnaphthalene	0.0004	<0.0001
Naphthalene	0.0003	<0.0001
Phenol	0.0003	<0.0001
1-Methylnaphthalene	0.0003	<0.0001
Formaldehyde	0.0001	<0.0001
o-Cresol	ND	NA

ND = Not Applicable: NA = Not Applicable

Core Storage

Analytes	Average	STDEV
HC as Hexane	0.0171	0.0019
Sum of VOCs	0.0008	0.0001
Sum of HAPs	0.0008	0.0001
Sum of POMs	0.0007	0.0001
Individual Organic HAPs and VOCs		
2-Methylnaphthalene	0.0003	<0.0001
Naphthalene	0.0003	<0.0001
1-Methylnaphthalene	0.0002	<0.0001
Formaldehyde	<0.0001	<0.0001
o-Cresol	ND	NA
Phenol	ND	NA

ND = Not Detected: NA = Not Applicable

Table 3-2 Average EQ Emission Results – Lb/Tn Sand

Core Mixing

Analytes	Average	STDEV
TGOC as Propane	0.1392	0.0021
HC as Hexane	0.0889	0.0564
Sum of VOCs	0.0031	0.0001
Sum of HAPs	0.0031	0.0001
Sum of POMs	ND	NA
Individual Organic HAPs and VOCs		
Phenol	0.0030	0.0001
Formaldehyde	0.0001	<0.0001
o-Cresol	ND	NA
1-Methylnaphthalene	ND	NA
2-Methylnaphthalene	ND	NA
Naphthalene	ND	NA

ND = Not Detected: NA = Not Applicable

Core Making

Analytes	Average	STDEV
HC as Hexane	2.7191	0.3557
Sum of VOCs	0.0534	0.0149
Sum of HAPs	0.0534	0.0149
Sum of POMs	0.0398	0.0144
Individual Organic HAPs and VOCs		
Phenol	0.0108	0.0006
Formaldehyde	0.0028	0.0006
o-Cresol	ND	NA
1-Methylnaphthalene	0.0102	0.0044
2-Methylnaphthalene	0.0165	0.0057
Naphthalene	0.0131	0.0043

ND = Not Detected: NA = Not Applicable

Core Storage

Analytes	Average	STDEV
HC as Hexane	0.6005	0.0696
Sum of VOCs	0.0264	0.0044
Sum of HAPs	0.0264	0.0044
Sum of POMs	0.0259	0.0044
Individual Organic HAPs and VOCs		
Phenol	ND	NA
Formaldehyde	0.0005	0.0002
o-Cresol	ND	NA
1-Methylnaphthalene	0.0075	0.0015
2-Methylnaphthalene	0.0093	0.0015
Naphthalene	0.0090	0.0014

ND = Not Detected: NA = Not Applicable

Table 3-3 Average Emission Results – % Available Solvent

Analyte	Mixing	Gas/Purge Fugitives	Storage
HC as Hexane	0.6%	23.6%	5.1%

Table 3-4 Average Process and Source Data

Parameter	Mixing	Gas/Purge Fugitives	Storage
Available Solvent (lb)	0.289	1.21	0.042
Calculated Total Binder Weight (lb)	0.875	3.67	0.127
Calculated Total Sand Weight (lb)	50.2	209.9	7.2
Average Binder Percentage (BOS)	1.74	1.75	1.75
Test Run Duration (min)	7	30	300
Volumetric Flow Rate (cfm)	1.05	320	.33
Core Machine Cycle Time (min)	---	1.2	---
Purge Duration (sec)	---	20	---

Figure 3-1 Average Emission Results – Lb/Lb Binder

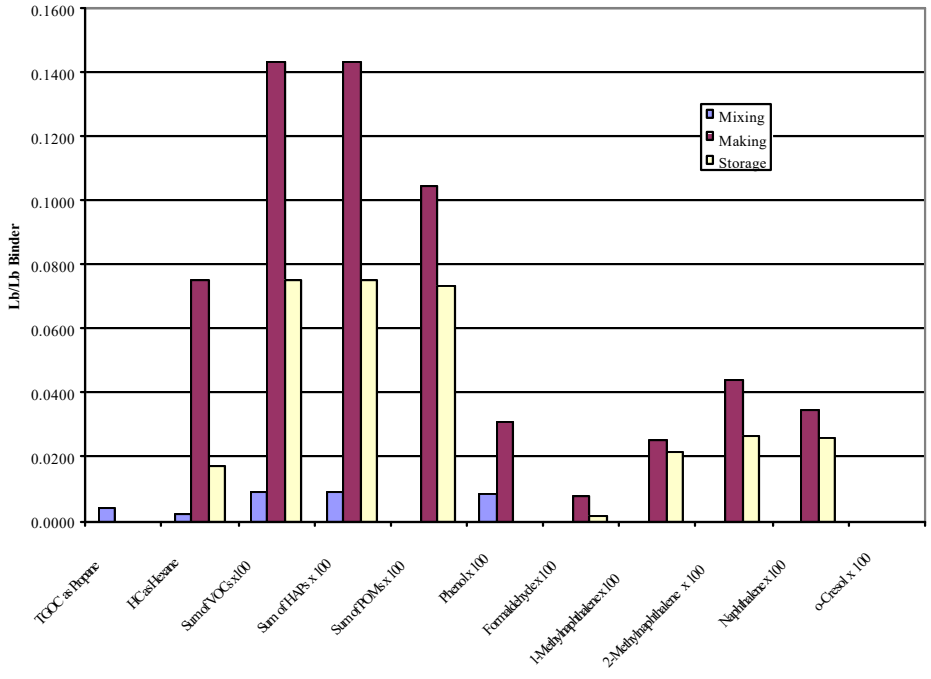
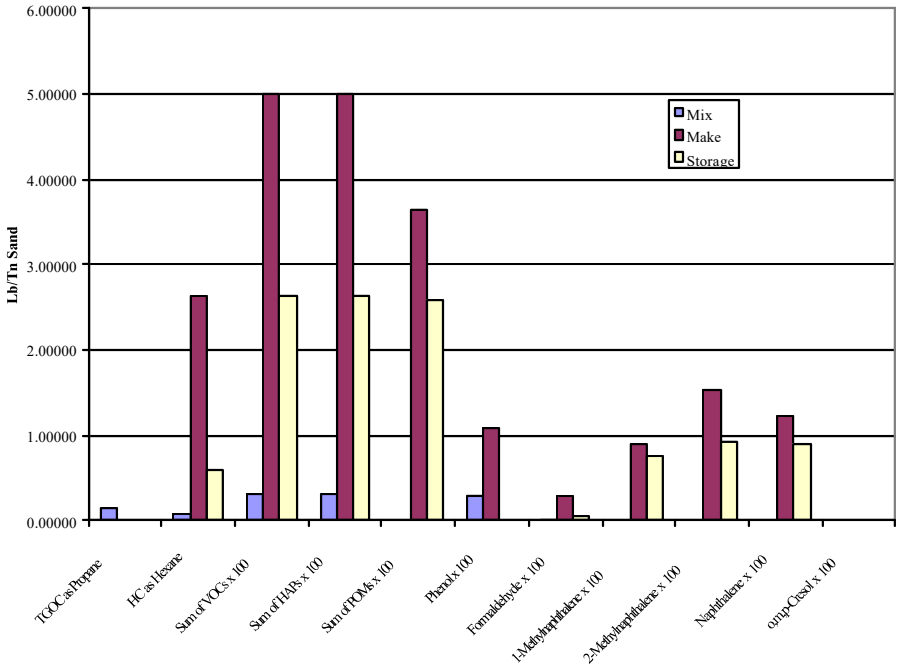


Figure 3-2 Average Emission Results – Lb/Tn Sand



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4.0 Discussion of Results

Volatile organic compound (VOC), hazardous air pollutant (HAP), and polycyclic organic material (POM) emissions were measured during core making activities associated with the use of a phenolic urethane binder system in the Technikon research and development core production facility. All of the core-making measurements were conducted within enclosures meeting the criteria for a temporary total enclosure according to US EPA Method 204.

Mixing

The mixing HAP emissions mainly consisted of phenol and formaldehyde. The HC as Hexane results for mixing contributed approximately 2% of the total found during these three test segments.

Gas/Purge and Fugitives

The HC as hexane results for gas/purge and fugitive emissions contributed approximately 80% of the total found during these three test segments.

Storage

The storage segment contributed 18% of the total found during these three test segments.

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APPENDIX A APPROVED TEST PLAN AND SAMPLE PLAN

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TECHNIKON TEST PLAN

CONTRACT NUMBER: 1409 **TASK NUMBER:** 1.2.3

WORK ORDER NUMBER: 1165 **SERIES:** EQ

SAMPLE EVENTS: EQ001-009 mix, EQ021-029 make, EQ031-039 store

SITE: ___PRE-PRODUCTION (243) _X__ FOUNDRY(238)

TEST TYPE: Capability, core mixing, core making, core storage baseline 2002

METAL TYPE: None

MOLD TYPE: None

NUMBER OF MOLDS: NonE

CORE TYPE: AFS Step Core, Ashland Isocure ® LF305/52-904GR Phenolic urethane binder, TEA catalyzed

TEST DATE: **START:** 19 Aug 2002

FINISHED: 13 Sep 2002

TEST OBJECTIVES:

1. Develop facility and methods to make a core mix, make, and store baseline having significantly reduced process variability and improved independent sample capture methods.

2. Measure selective HAP and VOC emissions from Core sand mixing, Gas & Purge and Fugitive Core Making, and Core Storage of AFS step cores made with 1.75% Ashland binder to make a 2002 Core baseline.

VARIABLES:

1. Core sand mixing: The uncoated sand shall be Wexford W450 Lakesand. It shall be preheated or cooled to maintain a temperature of 85 +/- 5 degrees Fahrenheit. The binder shall be 1.75 +/- .0175% Ashland 305/52-904 mixed Part I/Part II in the ratio of 55/45. The sand will be coated in the Redford/Carver 50 pound core sand mixer for 7 minutes. One minute shall be used to dispense the sand and the two binder components and one additional minute shall be used strictly for discharging the muller. Each core sand mixing test shall be one seven (7) minute 50-pound cycle within the muller only monitored continuously by TGOC and adsorption tube sampling. Prior to the first test five (5) batches shall be run to the storage hopper to normalize the background. Sampling media will be changed after each one-cycle test, during which time mixing will continue in order to maintain the background concentration. A total of nine (9) mixing tests shall be run.

2. Core Making: The Redford/Carver core machine will operate on a nominal one (1) minute door-to-door cycle. The environmental enclosure shall be supplied with air controlled to 82 +/- 5 degrees Fahrenheit. TEA will be fed to the core machine at a nominal 5 grams per cycle. The purge pressure shall be 20+/-2 psi. The core-make test will begin after the

core machine has run sufficient time, at rate, to have the background emission concentration stabilize. Each core-make test will be 30 core cycles, about one half hour long, with continuous TGOC and adsorption tube sampling. Sample media will be changed after each 30-cycle test. The core machine will run continuously during media change and testing to maintain the background concentration. The gas & purge and fugitive emissions will be collected to a common sampling stack.

3. Core Storage: The store test will consist of weighed cores sampled four (4) at a time, from the core machine and placed in individual sampling domes. The domes are in a temperature-controlled room at 82+/- 5 degrees Fahrenheit and sampled continuously with TGOC and adsorption tubes for 5 hours.

BRIEF OVERVIEW: Core making is not a single process but rather a series of steps, each with its own process collectable and fugitive emissions. This test will look at selected HAP & VOC emissions from combined process collectable and fugitive emission streams during each of the core sand mixing, core making, and core storage steps.

SPECIAL CONDITIONS: The sand mixer will have a removable lid that allows air to infiltrate radially from the perimeter. Materials will be charged though a closeable door in the lid. Samples will be extracted from the center of the headspace below the lid. The core machine with step core tooling shall be housed in a double walled emission enclosure. The area between the walls shall be flushed with temperature-controlled air at 80+/-5 degrees Fahrenheit. This air shall be the ambient make up air for the core process within the enclosure. The core box and core machine shall be tightly plumbed to extract gasses passed through the core box into a common sampling stack with the fugitive gasses. The sampling environment will be maintained at 75-85°F.

Original Signed
Process Engineering Manager (Technikon) **Date**

Original Signed
V.P. Measurement Technology (Technikon) **Date**

Original Signed
V.P. Operations (Technikon) **Date**

Original Signed
CERP Representative **Date**

Series EQ (Baseline)

Core Sand Mixing, Curing, and Storage

A. The Experiment:

1. Design and develop improved capability to evaluate the standard emissions from the mixing, making, and storage of gas catalyzed cold reacting core sand mixtures.
2. Evaluate the emissions from Ashland ISOCURE® LF305/52-904 part I and part II binder system to form a mixing, making, storage baseline for Iron-Phenolic Urethane binder systems.

B. Capability Study:

1. Mixing: Design and manufacture a capture hood for the Carver 50 pound capacity core sand mixer consisting of:

   a. An annular air makeup port which allows air to enter the mixer radially in such a way as to not significantly affect the emission evaporation from the sand surface.
   b. The ventilation rate shall be sufficient to prevent escape of the emissions except to the emission-sampling stream.
   c. An emission sampling port centered on the capture hood.
   d. A discharge pipe connected to a sampling train and pump via a heated line to the THC analyzer.

2. Core Making: Design and manufacture a total emission enclosure to capture and sample aggregate emissions from both the core box gas-purge cycles and fugitives from the enclosure.

   a. A gassing head capable of independently delivering a catalyzing gas and purge air from the external Luber gas generator to the common fugitives collection pipe. The flow rate in the sampling pipe at the sampling location must be virtually independent of the whether the gas-purge cycle is active.

3. Storage: Design and manufacture a set of four-storage emission sampling chambers.

   a. Each chamber shall have independent air flow controls.
   b. The sum of the chamber flows shall not exceed 50 liters/minute.
   c. One chamber shall be connected to the THC analyzer.
   d. Three chambers shall be connected to a sampling train via independent sampling media.

4. Conduct a set of preliminary tests to verify that the design criteria are met.

a. Conduct a "mixedness" test to verify that the mixer will create a homogeneous mixture within the prescribed mixing time.
b. Conduct a THC mixing calibration run according to the mixing schedule described below in order to determine the required media flow rates.
c. Conduct a THC core making calibration at 60 core /hour in order to determine the required media flow rates.
d. Conduct a THC core storage calibration run using core made per the core make procedure in order to determine the required media flow rates.
e. Record the ambient air temperature, pressure, and moisture content; scavenging air velocity; all machine parameters; all core weights; and all events.

C. Mixing Test: Nine discrete seven (7) minute batches run contiguously.

1. The test shall be conducted in the 50-pound Carver core sand mixer fitted with the capture hood with make-up air ventilation.

a. The emission sample shall be taken from the air space above the mixing sand.

2. Mixing

a. Turn on the Kloster sand heater/cooler. Adjust the set point so that sand is delivered to the mixer in the temperature range of 80-90°F.
b. Attach the emission sampling equipment to the 50-pound Carver core sand mixer.
c. Pre-measure 1.75% (BOS) Ashland ISOCURE® binder based on a 50 pound batch.

1) Part I (LF305) is 55% of the total resin and is 218.3 grams.
2) Part II (52-904) is 45% of the total resin and is 178.6 grams

Note: pre-wet the dispensing cup and tare the wet cup.

d. Pre-Weigh 50 pounds of Wexford W450 Lake Sand, heated to 80-90°F in the Kloster sand heater/cooler, in the Simpson Technologies weight system.
e. Place the capture hood on top of the mixer. Start the mixer.
f. Start the timer. Start monitoring with the THC only. Monitor with the THC continuously until the end of the test.
g. Make five (5) emission background-generating batches.
h. The procedure for this and the contiguously run test batches shall be as follows: Add the 50 pounds of raw sand, about 20-25 seconds, followed by the binder part I dispensed over 20 seconds, followed by binder part II dispensed over 20 seconds. All materials should be in the mixer within 50-70 seconds from start of the batch. Mix each batch until a total of 6 minutes have elapsed, then discharge the batch until a total of 7 minutes has elapsed from the start of the batch. Be prepared to recharge the mixer for the next batch immediately at the end of each 7-minute period.
i. During this activity the next set of components must be weighed and made ready. Having two or three material sets weighed and protected at all times makes the process go smoothly.

j. At the end of fifth batch (35 minutes)

1) Close the discharge door.
2) Open the sample train to the mixer.
3) The emission sample size will be one (1) batch.
4) During the next batch the media will be changed.
5) The next batch will be an emission sample again.
6) Continue alternating until nine (9) emission tests are complete.

k. Repeat steps C.2.g-h for as many cycles as is necessary to complete the five (5) background batches, the nine (9) emission test batches, and nine (9) media changing periods, a total of 23 batches. Continue batches uninterrupted during media changes between tests.

D. Core Making test: Nine (9) tests each having thirty (30) approximately one (1) minute core cycles.

1. Turn on the core storage room temperature control system 24 hours ahead of expected use time. Set control so that the core machine sees 80°F.
2. Turn on and adjust the Luber TEA gas generator.

a. Make sure there is enough TEA in the Luber TEA storage tank.
b. Set the MAX WORKING PRESSURE to 45 psi.
c. Set the gassing time (T1) to 0.75 seconds
d. Adjust the TEA flow rate to .019 pounds/second.

Note: This will give an amine input of 5.1 grams per cycle.

e. Leave the Timer TR1 at 0.3 seconds, the proportional valve voltage at 7.5 volts and timer at 3 seconds, the low purge pressure at 10 psi and high purge pressure at 45 psi.

Note: This should yield a working pressure of about 7 psi.

f. Connect the TEA weighing container to the Luber supply line.

1) Dispense about 250 grams of TEA into the weigh container. The scale has a 300-gram capacity.
2) Isolate the Luber TEA storage tank.

g. Conduct 5 gassing purge cycles within ½ hour of testing to stabilize the Luber generator.

1) Vent this material to the scrubber.
2) Record the TEA weight dispensed.

h. Record the ambient temperature, the inlet pressure, Max working pressure, working pressure, TEA flow rate, gassing timer value, & purge timer value.

3. Attach the emission sample train to the gas-purge-fugitive sample pipe.
4. Begin monitoring with the THC.
5. Prepare the core sand in the Carver mixer according to section C.2.g-h except without the emission sampling equipment attached to the mixer.
6. Prepare the core machine emission enclosure.
7. Verify that the temperature controlled core test room is set to deliver air at 75-85°F to the core enclosure.
8. Set up the Redford/Carver core machine with the step core corebox.
9. Verify that the air temperature in the gas-purge-fugitive exhaust tube is 75-85 degrees Fahrenheit.
10. Set the Redford/Carver core machine to gas for 0.75 seconds with zero (0) second delay after gassing and twenty (20) second purge. Total cycle time to be one (1) minute. Set the cycle counter to zero (0).
11. Start and calibrate the Luber TEA vaporizer to dispense 5.0-5.2 grams of TEA per machine cycle.
12. Mix core sand per section C.2.g-h, as required, in fifty (50) pound batches to assure continuity of production.
13. Cycle the core machine for 10-15 cycles or until fugitives emissions are stable based on the THC and good core manufacture is achieved. Note: if release agent is required brush release agent on to core box do not spray.
14. Make cores continuously as above. Any stoppage will impact the fugitives emission level.
15. Record the number and weight of each core throughout the test.
16. When everybody is ready, start the emission-sampling clock and open the sample train. Sample continuously for 30 core cycles, approximately thirty (30) minute, then close the sample train.
17. Do not stop making core.
18. Set up the sample train again and repeat the test for another thirty-core test. A total of nine (9) half-hour tests are to be performed.
19. Empty and clean the core machine and core sand mixer.

E. Core storage tests.

1. Prepare the 4 individual core storage emission enclosures.
2. Set up a THC to monitor one enclosure and the sample train to monitor the other three enclosures and calibrate them.
3. Mix sand by the method of section C.2.g-h.
4. Make core by the method of Section D.
5. Number, weigh, and record each core.
6. When good core are being made sample four (4) cores whose weight is 7.30, 7.35, or 7.40 pounds for the storage test. Place these cores in the core storage emission enclosures.

7. Close the enclosure bonnet, start the test clock, open to the THC or the sample train.
8. Record the start time for each core as well as the core weight
9. Continue sampling train for 5 hours then close the sample train. Separate longer tests may be conducted by this procedure at the discretion of the emission team.
10. Continue the THC monitoring for 24 hours.
11. Repeat this procedure to obtain nine (9) discrete tests plus the THC monitoring.

Steven Knight
Mgr. Process Engineering

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 1											
THC	EQ-00101	X									TOTAL
NIOSH 1500	EQ-00102		1						20	1	100/50 mg Charcoal (SKC 226-01)
NIOSH 1500	EQ-00103			1					20	2	400/200 mg Charcoal (Orbo 32)
NIOSH 1500	EQ-00104				1						400/200 mg Charcoal (Orbo 32)
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00105		1						1000	8	400/200 mg Silica Gel (Orbo 53)
NIOSH 2002	EQ-00106			1					1000	9	400/200 mg Silica Gel (Orbo 53)
NIOSH 2002	EQ-00107				1						400/200 mg Silica Gel (Orbo 53)
TO11	EQ-00108		1						1000	10	(DNPH cartridge sep-pak)
TO11	EQ-00109				1				1000	11	(DNPH cartridge sep-pak)
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 2											
THC	EQ-00201	X									TOTAL
NIOSH 1500	EQ-00202		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00203		1						1000	8	400/200 mg Silica Gel (Orbo 53)
TO11	EQ-00204		1						1000	9	(DNPH cartridge sep-pak)
TO11	EQ-00205			1					1000	10	(DNPH cartridge sep-pak)
									1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 3											
THC	EQ-00301	X									TOTAL
NIOSH 1500	EQ-00302		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00303		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-00304		1						1000	10	(DNPH cartridge sep-pak)
TO11	EQ-00305					1			1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 4											
THC	EQ-00401	X									TOTAL
NIOSH 1500	EQ-00402		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00403		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-00404		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 5											
THC	EQ-00501	X									TOTAL
NIOSH 1500	EQ-00502		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00503		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-00504		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 6											
THC	EQ-00601	X									TOTAL
NIOSH 1500	EQ-00602		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00603		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-00604		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 7											
THC	EQ-00701	X									TOTAL
NIOSH 1500	EQ-00702		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00703		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-00704		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 8											
THC	EQ-00801	X									TOTAL
NIOSH 1500	EQ-00802		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00803		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-00804		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 9											
THC	EQ-00901	X									TOTAL
NIOSH 1500	EQ-00902		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00903		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-00904		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 10											
THC	EQ-01001	X									TOTAL
NIOSH 1500	EQ-01002		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-01003		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-01004		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 11											
THC	EQ-01101	X									TOTAL
NIOSH 1500	EQ-01102		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-01103		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-01104		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 12											
THC	EQ-01201	X									TOTAL
NIOSH 1500	EQ-01202		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-01203		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-01204		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 13											
THC	EQ-01301	X									TOTAL
NIOSH 1500	EQ-01302		1						20	1	100/50 mg Charcoal (SKC 226-01)
NIOSH 1500	EQ-01303			1					20	2	400/200 mg Charcoal (Orbo 32)
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-01305		1						1000	8	400/200 mg Silica Gel (Orbo 53)
NIOSH 2002	EQ-01306			1					1000	9	400/200 mg Silica Gel (Orbo 53)
TO11	EQ-01308		1						1000	10	(DNPH cartridge sep-pak)
TO11	EQ-01309					1			1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 1											
THC	EQ-02101	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02102		1						500	5	100/50 mg Charcoal (SKC 226-01)
NIOSH 1500	EQ-02103			1					500	6	100/50 mg Charcoal (SKC 226-01)
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02104		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
NIOSH 2002	EQ-02105			1					1000	10	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02106		1						1000	11	(DNPH cartridge sep-pak)
	Excess									12	Excess
	Excess									13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 2											
THC	EQ-02201	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02202		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02203		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02204		1						1000	10	(DPNH cartridge sep-pak)
	EQ-02205			1					1000	11	(DPNH cartridge sep-pak)
	Excess									12	Excess
	Excess									13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 3											
THC	EQ-02301	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02302		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02303		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02304		1						1000	10	(DPNH cartridge sep-pak)
TO11	EQ-02305					1			1000	10	(DPNH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess									12	Excess
	Excess									13	

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 4											
THC	EQ-02401	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02402		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02403		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02404		1						1000	10	(DPNH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess									12	Excess
	Excess									13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 5											
THC	EQ-02501	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02502		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02503		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02504		1						1000	10	(DPNH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess									12	Excess
	Excess									13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 6											
THC	EQ-02601	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02602		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02603		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02604		1						1000	10	(DPNH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess									12	Excess
	Excess									13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 7											
THC	EQ-02701	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02702		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02703		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02704		1						1000	10	(DPNH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess									12	Excess
	Excess									13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 8											
THC	EQ-02801	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02802		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02803		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02804		1						1000	10	(DPNH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess									12	Excess
	Excess									13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											**30 Minute Test**
EVENT 9											
THC	EQ-02901	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02902		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02903		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02904		1						1000	10	(DPNH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess									12	Excess
	Excess									13	Excess

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/10/02											**5-Hr. Test-Core 1**
EVENT 1											
NIOSH 1500	EQ-03101		1						25	1	100/50 mg Charcoal (SKC 226-01)
NIOSH 1500	EQ-03102			1					25	2	100/50 mg Charcoal (SKC 226-01)
NIOSH 2002	EQ-03103		1						60	3	150/75 mg Silica Gel (SKC 226-10)
NIOSH 2002	EQ-03104			1					30	4	150/75 mg Silica Gel (SKC 226-10)
TO-11	EQ-03105		1						200	5	(DPNH cartridge sep-pak)
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/10/02											**5 Hour Test-Core 2**
EVENT 2											
NIOSH 1500	EQ-03201		1						30	1	100/50 mg Charcoal (SKC 226-01)
	Excess								20	2	Excess
NIOSH 2002	EQ-3202		1						60	3	150/75 mg Silica Gel (SKC 226-10)
TO-11	EQ-3203		1						200	4	(DPNH cartridge sep-pak)
TO-11	EQ-3204			1					200	5	(DPNH cartridge sep-pak)
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/10/02											**5 Hour Test-Core 3**
EVENT 3											
NIOSH 1500	EQ-03301		1						30	1	100/50 mg Charcoal (SKC 226-01)
	Excess								30	2	Excess
NIOSH 2002	EQ-03302		1						60	3	150/75 mg Silica Gel (SKC 226-10)
TO-11	EQ-03303		1						200	4	(DPNH cartridge sep-pak)
TO-11	EQ-03304					1			200	4	(DPNH cartridge sep-pak)
	Excess								200	5	Excess
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											**5 Hour Test-Core 4**
EVENT 4											
NIOSH 1500	EQ-03401		1						25	1	100/50 mg Charcoal (SKC 226-01)
	Excess								25	2	Excess
NIOSH 2002	EQ-03402		1						60	3	150/75 mg Silica Gel (SKC 226-10)
	Excess								30	4	Excess
TO-11	EQ-03403		1						200	5	(DPNH cartridge sep-pak)
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											**5 Hour Test-Core 5**
EVENT 5											
NIOSH 1500	EQ-03501		1						30	1	100/50 mg Charcoal (SKC 226-01)
	Excess								20	2	Excess
NIOSH 2002	EQ-03502		1						60	3	150/75 mg Silica Gel (SKC 226-10)
TO-11	EQ-03503		1						200	4	(DPNH cartridge sep-pak)
	Excess								200	5	Excess
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											**5 Hour Test-Core 6**
EVENT 6											
NIOSH 1500	EQ-03601		1						30	1	100/50 mg Charcoal (SKC 226-01)
	Excess								30	2	Excess
NIOSH 2002	EQ-03602		1						60	3	150/75 mg Silica Gel (SKC 226-10)
TO-11	EQ-03603		1						200	4	(DPNH cartridge sep-pak)
	Excess								200	5	Excess
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											**5 Hour Test-Core 7**
EVENT 7											
NIOSH 1500	EQ-03701		1						25	1	100/50 mg Charcoal (SKC 226-01)
	Excess								25	2	Excess
NIOSH 2002	EQ-03702		1						60	3	150/75 mg Silica Gel (SKC 226-10)
	Excess								30	4	Excess
TO-11	EQ-03703		1						200	5	(DPNH cartridge sep-pak)
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											**5 Hour Test-Core 8**
EVENT 8											
NIOSH 1500	EQ-03801		1						30	1	100/50 mg Charcoal (SKC 226-01)
	Excess								20	2	Excess
NIOSH 2002	EQ-03802		1						60	3	150/75 mg Silica Gel (SKC 226-10)
TO-11	EQ-03803		1						200	4	(DPNH cartridge sep-pak)
	Excess								200	5	Excess
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											**5 Hour Test-Core 9**
EVENT 9											
NIOSH 1500	EQ-03901		1						30	1	100/50 mg Charcoal (SKC 226-01)
	Excess								30	2	Excess
NIOSH 2002	EQ-03902		1						60	3	150/75 mg Silica Gel (SKC 226-10)
TO-11	EQ-03903		1						200	4	(DPNH cartridge sep-pak)
	Excess								200	5	Excess
	Excess								Variable	6	No Critical Orifice

APPENDIX B DETAILED TEST AND PROCESS DATA

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Individual Mixing Test Results – Lb/Lb Binder

Core Mixing 1.75% Binder

HAPs	POMs	Compound/Sample Number	EQ004	EQ005	EQ006	EQ007	EQ008	EQ009	EQ010	EQ011	EQ012	Average	STDEV
		Test Dates	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02		
		TGOC as Propane	4.20E-03	4.00E-03	4.00E-03	4.00E-03	4.10E-03	4.00E-03	4.00E-03	4.00E-03	4.10E-03	4.04E-03	7.26E-05
		HC as Hexane	2.23E-03	1.43E-03	1.79E-03	2.05E-03	2.10E-03	2.17E-03	1.99E-03	2.43E-03	2.31E-03	2.06E-03	2.98E-04
		Sum of VOCs	9.33E-05	8.88E-05	9.15E-05	8.97E-05	8.52E-05	8.97E-05	8.90E-05	8.88E-05	9.95E-05	9.06E-05	3.97E-06
		Sum of HAPs	9.33E-05	8.88E-05	9.15E-05	8.97E-05	8.52E-05	8.97E-05	8.90E-05	8.88E-05	9.95E-05	9.06E-05	3.97E-06
		Sum of POMs	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
			Individual Organic HAPs and VOCs										
x		Phenol	8.98E-05	8.54E-05	8.81E-05	8.63E-05	8.18E-05	8.63E-05	8.55E-05	8.53E-05	9.61E-05	8.72E-05	3.98E-06
x		Formaldehyde	3.50E-06	3.42E-06	3.37E-06	3.41E-06	3.42E-06	3.48E-06	3.49E-06	3.53E-06	3.42E-06	3.45E-06	5.47E-08
x		o-Cresol	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
x	z	1-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
x	z	2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
x	z	Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA

ND: Non Detect; **NA:** Not Applicable
Formaldehyde results reported as a mimimum.

Individual Gas/Purge and Fugitive Test Results – Lb/Lb Binder

Core Making 1.75% Binder

HAPs	POMs	Compound/Sample Number	EQ021	EQ022	EQ023	EQ024	EQ025	EQ026	EQ027	EQ028	EQ029	Average	STDEV
		Test Dates	9/11/02	9/11/02	9/11/02	9/11/02	9/11/02	9/12/02	9/12/02	9/12/02	9/12/02		
		TGOC as Propane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		HC as Hexane	7.29E-02	7.70E-02	7.83E-02	8.51E-02	7.96E-02	6.93E-02	7.29E-02	7.04E-02	7.15E-02	7.52E-02	5.14E-03
		Sum of VOCs	1.14E-03	1.70E-03	1.58E-03	1.68E-03	1.40E-03	1.22E-03	1.32E-03	1.38E-03	1.49E-03	1.43E-03	1.96E-04
		Sum of HAPs	1.14E-03	1.70E-03	1.58E-03	1.68E-03	1.40E-03	1.22E-03	1.32E-03	1.38E-03	1.49E-03	1.43E-03	1.96E-04
		Sum of POMs	7.58E-04	1.27E-03	1.21E-03	1.27E-03	1.07E-03	8.32E-04	9.07E-04	9.73E-04	1.10E-03	1.04E-03	1.88E-04
			Individual Organic HAPs and VOCs										
x	z	2-Methylnaphthalene	3.04E-04	5.49E-04	5.08E-04	5.47E-04	4.52E-04	3.47E-04	3.69E-04	4.08E-04	4.58E-04	4.38E-04	8.77E-05
x	z	Naphthalene	2.77E-04	4.47E-04	3.96E-04	4.00E-04	3.44E-04	2.80E-04	3.16E-04	3.21E-04	3.66E-04	3.50E-04	5.77E-05
x		Phenol	2.98E-04	3.41E-04	2.92E-04	3.30E-04	2.98E-04	3.07E-04	3.15E-04	3.15E-04	2.97E-04	3.10E-04	1.67E-05
x	z	1-Methylnaphthalene	1.77E-04	2.77E-04	3.04E-04	3.23E-04	2.70E-04	2.06E-04	2.22E-04	2.45E-04	2.77E-04	2.55E-04	4.73E-05
x		Formaldehyde	8.02E-05	9.05E-05	8.03E-05	7.81E-05	3.39E-05	8.35E-05	9.37E-05	8.95E-05	9.15E-05	8.01E-05	1.83E-05
x		o-Cresol	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA

ND: Non Detect; **NA:** Not Applicable

Individual Storage Test Results – Lb/Lb Binder

Core Storage 1.75% Binder

HAPs	POMs	Compound/Sample Number	EQ031	EQ032	EQ033	EQ034	EQ035	EQ036	EQ037	EQ038	EQ039	Average	STDEV
		Test Dates	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02		
		TGOC as Propane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		HC as Hexane	1.71E-02	1.47E-02	1.80E-02	I	1.74E-02	2.09E-02	1.54E-02	1.59E-02	1.74E-02	1.71E-02	1.91E-03
		Sum of VOCs	8.64E-04	6.08E-04	8.66E-04	I	7.18E-04	8.92E-04	5.80E-04	6.78E-04	8.04E-04	7.51E-04	1.22E-04
		Sum of HAPs	8.64E-04	6.08E-04	8.66E-04	I	7.18E-04	8.92E-04	5.80E-04	6.78E-04	8.04E-04	7.51E-04	1.22E-04
		Sum of POMs	8.46E-04	5.92E-04	8.48E-04	I	7.11E-04	8.84E-04	5.64E-04	6.61E-04	7.85E-04	7.36E-04	1.23E-04
			Individual Organic HAPs and VOCs										
x	z	2-Methylnaphthalene	3.16E-04	2.13E-04	2.96E-04	I	2.53E-04	3.09E-04	2.11E-04	2.34E-04	2.96E-04	2.66E-04	4.34E-05
x	z	Naphthalene	2.90E-04	1.99E-04	2.86E-04	I	2.48E-04	3.08E-04	2.05E-04	2.43E-04	2.78E-04	2.57E-04	4.01E-05
x	z	1-Methylnaphthalene	2.41E-04	1.79E-04	2.66E-04	I	2.10E-04	2.67E-04	1.48E-04	1.84E-04	2.10E-04	2.13E-04	4.27E-05
x		Formaldehyde	1.75E-05	1.69E-05	1.84E-05	I	7.16E-06	8.16E-06	1.63E-05	1.68E-05	1.83E-05	1.49E-05	4.56E-06
x		o-Cresol	ND	ND	ND	I	ND	ND	ND	ND	ND	NA	NA
x		Phenol	ND	ND	ND	I	ND	ND	ND	ND	ND	NA	NA

I: Data rejected based on data validation considerations
ND: Non Detect; **NA:** Not Applicable

Individual Results for Test EQ – Lb/Tn Sand

Core Mixing 1.75% Binder

HAPs	POMs	Compound/Sample Number	EQ004	EQ005	EQ006	EQ007	EQ008	EQ009	EQ010	EQ011	EQ012	Average	STDEV
		Test Dates	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002		
		TGOC as Propane	1.44E-01	1.37E-01	1.38E-01	1.38E-01	1.41E-01	1.39E-01	1.39E-01	1.39E-01	1.41E-01	1.39E-01	2.18E-03
		HC as Hexane	7.59E-02	4.88E-02	6.10E-02	7.06E-02	7.22E-02	7.47E-02	6.84E-02	8.36E-02	7.95E-02	7.05E-02	1.04E-02
		Sum of VOCs	3.18E-03	3.02E-03	3.12E-03	3.08E-03	2.93E-03	3.09E-03	3.06E-03	3.05E-03	3.42E-03	3.11E-03	1.36E-04
		Sum of HAPs	3.18E-03	3.02E-03	3.12E-03	3.08E-03	2.93E-03	3.09E-03	3.06E-03	3.05E-03	3.42E-03	3.11E-03	1.36E-04
		Sum of POMs	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
		Individual Organic HAPs and VOCs											
x		Phenol	3.06E-03	2.91E-03	3.00E-03	2.97E-03	2.81E-03	2.97E-03	2.94E-03	2.93E-03	3.30E-03	2.99E-03	1.36E-04
x		Formaldehyde	1.19E-04	1.16E-04	1.15E-04	1.17E-04	1.17E-04	1.20E-04	1.20E-04	1.21E-04	1.17E-04	1.18E-04	2.07E-06
x		o-cresol	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
x	z	1-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
x	z	2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
x	z	Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA

ND: Non Detect; **NA;** Not Applicable

Formaldehyde results reported as a minimum due to apparent breakthrough.

Core Making 1.75% Binder

HAPs	POMs	Compound/Sample Number	EQ021	EQ022	EQ023	EQ024	EQ025	EQ026	EQ027	EQ028	EQ029	Average	STDEV
		Test Dates	9/11/2002	9/11/2002	9/11/2002	9/11/2002	9/11/2002	9/12/2002	9/12/2002	9/12/2002	9/12/2002		
		TGOC as Propane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		HC as Hexane	2.54E+00	2.69E+00	2.74E+00	2.98E+00	2.79E+00	2.41E+00	2.53E+00	2.47E+00	2.51E+00	2.63E+00	1.84E-01
		Sum of VOCs	3.96E-02	5.95E-02	5.54E-02	5.87E-02	4.90E-02	4.25E-02	4.58E-02	4.82E-02	5.21E-02	5.01E-02	6.94E-03
		Sum of HAPs	3.96E-02	5.95E-02	5.54E-02	5.87E-02	4.90E-02	4.25E-02	4.58E-02	4.82E-02	5.21E-02	5.01E-02	6.94E-03
		Sum of POMs	2.64E-02	4.44E-02	4.24E-02	4.44E-02	3.74E-02	2.89E-02	3.15E-02	3.41E-02	3.85E-02	3.65E-02	6.65E-03
		Individual Organic HAPs and VOCs											
x	z	2-Methylnaphthalene	1.06E-02	1.92E-02	1.78E-02	1.91E-02	1.59E-02	1.21E-02	1.28E-02	1.43E-02	1.60E-02	1.53E-02	3.09E-03
x	z	Naphthalene	9.66E-03	1.56E-02	1.39E-02	1.40E-02	1.20E-02	9.73E-03	1.10E-02	1.12E-02	1.28E-02	1.22E-02	2.03E-03
x		Phenol	1.04E-02	1.19E-02	1.03E-02	1.16E-02	1.04E-02	1.07E-02	1.10E-02	1.10E-02	1.04E-02	1.08E-02	5.73E-04
x	z	1-Methylnaphthalene	6.17E-03	9.65E-03	1.07E-02	1.13E-02	9.46E-03	7.15E-03	7.72E-03	8.56E-03	9.70E-03	8.93E-03	1.67E-03
x		Formaldehyde	2.80E-03	3.16E-03	2.82E-03	2.73E-03	1.19E-03	2.90E-03	3.26E-03	3.13E-03	3.21E-03	2.80E-03	6.36E-04
x		o-cresol	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA

ND: Non Detect; NA; Not Applicable

Core Storage 1.75% Binder

HAPs	POMs	Compound/Sample Number	EQ031	EQ032	EQ033	EQ034	EQ035	EQ036	EQ037	EQ038	EQ039	Average	STDEV
		Test Dates	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002		
		TGOC as Propane	NA	NA	NA	I	NA	NA	NA	NA	NA	NA	NA
		HC as Hexane	5.97E-01	5.16E-01	6.31E-01	I	6.14E-01	7.39E-01	5.42E-01	5.58E-01	6.09E-01	6.01E-01	6.85E-02
		Sum of VOCs	3.02E-02	2.13E-02	3.03E-02	I	2.54E-02	3.15E-02	2.03E-02	2.38E-02	2.82E-02	2.64E-02	4.30E-03
		Sum of HAPs	3.02E-02	2.13E-02	3.03E-02	I	2.54E-02	3.15E-02	2.03E-02	2.38E-02	2.82E-02	2.64E-02	4.30E-03
		Sum of POMs	2.96E-02	2.07E-02	2.97E-02	I	2.51E-02	3.12E-02	1.98E-02	2.32E-02	2.75E-02	2.58E-02	4.33E-03
		Individual Organic HAPs and VOCs											
x	z	2-Methylnaphthalene	1.10E-02	7.47E-03	1.04E-02	I	8.94E-03	1.09E-02	7.38E-03	8.21E-03	1.04E-02	9.34E-03	1.52E-03
x	z	Naphthalene	1.01E-02	6.97E-03	1.00E-02	I	8.75E-03	1.09E-02	7.20E-03	8.50E-03	9.75E-03	9.02E-03	1.41E-03
x	z	1-Methylnaphthalene	8.43E-03	6.26E-03	9.30E-03	I	7.42E-03	9.42E-03	5.19E-03	6.45E-03	7.37E-03	7.48E-03	1.50E-03
x		Formaldehyde	6.12E-04	5.92E-04	6.45E-04	I	2.53E-04	2.88E-04	5.70E-04	5.87E-04	6.42E-04	5.24E-04	1.59E-04
x		o-cresol	ND	ND	ND	I	ND	ND	ND	ND	ND	NA	NA
x		Phenol	ND	ND	ND	I	ND	ND	ND	ND	ND	NA	NA

I: Data rejected based on data validation considerations.

ND: Non Detect; NA; Not Applicable

Individual Detection Levels for Test EQ

Test EQ Quantitation Limits - Lb/Tn Sand

Analytes	Core Mixing	Core Making	Core Storage
HC as hexane	2.30E-03	3.81E-03	2.32E-03
1-methylnaphthalene	2.30E-03	3.81E-03	2.32E-03
2-methylnaphthalene	2.30E-03	3.81E-03	2.32E-03
naphthalene	2.30E-03	3.81E-03	2.32E-03
o,m,p-cresol	3.00E-05	1.12E-03	5.69E-04
formaldehyde	1.24E-06	6.46E-05	9.32E-06
phenol	1.50E-05	9.30E-04	4.74E-04

Test EQ Quantitation Limits - Lb/Lb Binder

Analytes	Core Mixing	Core Making	Core Storage
HC as hexane	6.69E-05	1.09E-04	6.57E-05
1-methylnaphthalene	6.69E-05	1.09E-04	6.57E-05
2-methylnaphthalene	6.69E-05	1.09E-04	6.57E-05
naphthalene	6.69E-05	1.09E-04	6.57E-05
o,m,p-cresol	8.73E-07	3.19E-05	1.61E-05
formaldehyde	3.62E-08	1.85E-06	2.64E-07
phenol	4.37E-07	2.66E-05	1.34E-05

Detailed Process Data

Core Sand Mixing Test	1	2	3	4	5	6	7	8	9	10	11	12	13	Average All	Report Average
Date	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02		
Emission test No.	EQ001	EQ002	EQ003	EQ004	EQ005	EQ006	EQ007	EQ008	EQ009	EQ010	EQ011	EQ012	EQ013		
Total coated sand weight, Lbs.	51.4	50.9	50.9	**51.4**	**51.4**	**51.4**	**50.9**	**50.9**	**50.9**	**50.9**	**50.9**	**50.9**	50.9	51.0	**51.0**
Binder weight, Lbs.	0.876	0.875	0.874	**0.876**	**0.875**	**0.876**	**0.875**	**0.875**	**0.876**	**0.874**	**0.875**	**0.875**	0.874	0.875	**0.875**
Calculated % binder (BOS)	1.73	1.75	1.75	1.73	1.73	1.73	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.74	**1.74**
Calculated binder content,%	1.71	1.72	1.72	**1.71**	**1.70**	**1.71**	**1.72**	**1.72**	**1.72**	**1.72**	**1.72**	**1.72**	1.72	1.71	**1.71**
1800 F LOI, %	1.58	1.71	1.72	**1.62**	**1.54**	**1.65**	**1.58**	**1.56**	**1.64**	**1.64**	**ND**	**1.62**	1.60	1.62	**1.61**
Sand temperature, Deg F	84	83	84	**95**	**90**	**90**	**90**	**89**	**88**	**88**	**88**	**89**	90	88	**89.7**
													Note 2	Note 1	Note 1

Core Make Test	1	2	3	4	5	6	7	8	9	Average All	Report Average
Date	9/11/02	9/11/02	9/11/02	9/11/02	9/11/02	9/12/02	9/12/02	9/12/02	9/12/02		
Emission test No.	EQ021	EQ022	EQ023	EQ024	EQ025	EQ026	EQ027	EQ028	EQ029		
Total coated sand weight, Lbs.	212.8	210.9	213.3	200.6	197.4	212.2	212.8	213.7	215.8	209.9	**209.9**
Calculated Total Binder weight, Lbs.	3.71	3.68	3.74	3.51	3.46	3.69	3.70	3.74	3.78	3.7	**3.67**
Calculated % Binder (BOS)	1.745	1.747	1.754	1.750	1.754	1.741	1.738	1.750	1.750	1.748	**1.748**
1800 F LOI, %	1.62	1.60	1.60	1.58	1.56	1.58	1.53	1.56	1.55	1.58	**1.58**
Sand temperature, Deg F	87.4	86.8	87	89	87	87.2	89.2	90.8	89.2	88.5	**88.5**
TEA Injection/cycle, gm/cycle	3.90	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.50	**3.50**
Blow pressure, psi	30	30	30	30	30	30	30	30	30	30.0	**30.0**
Max. Purge Pressure, psi	45	45	45	45	45	45	45	45	45	45.0	**45.0**
Purge duration, sec	20	20	20	20	20	20	20	20	20	20.0	**20.0**
Machine cycles per test	30	30	30	31	29	30	30	30	30	30.0	**30.0**
Ave.core machine cycle time, sec.	65.3	75.7	71.0	95.6	82.6	69.8	66.9	64.6	63.2	72.7	**72.7**
										Note 1	Note 1

Core Storage Test	1	1	1	1	2	2	2	2	3	3	3	3	Average All	Report Average
Date	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02		
Emission test No.	THC1	EQ031	EQ032	EQ033	THC2	EQ034	EQ035	EQ036	THC-3	EQ037	EQ038	EQ039		
Total coated sand weight, Lbs.	7.25	**7.20**	**7.20**	**7.15**	7.25	**7.25**	**7.25**	**7.20**	7.30	**7.30**	**7.25**	**7.25**	7.2	**7.2**
Calculated total binder weight, Lbs.	0.127	**0.126**	**0.126**	**0.125**	0.128	**0.128**	**0.128**	**0.127**	0.128	**0.128**	**0.127**	**0.127**	0.127	**0.127**
Calculated % binder (BOS)	1.748	**1.748**	**1.748**	**1.748**	1.766	**1.766**	**1.766**	**1.766**	1.748	**1.748**	**1.748**	**1.748**	1.754	**1.754**
1800 F LOI, %	ND	**ND**	**ND**	**ND**	1.54	**1.54**	**1.54**	**1.54**	1.57	**1.57**	**1.57**	**1.57**	1.56	**1.56**
Average core weight, Lbs.	7.25	**7.20**	**7.20**	**7.15**	7.25	**7.25**	**7.25**	**7.20**	7.30	**7.30**	**7.25**	**7.25**	7.24	**7.24**
Sand temperature, Deg F	88	**88**	**88**	**88**	85	**85**	**85**	**85**	90	**90**	**90**	**90**	87.6	**87.6**
TEA Injection/cycle, gm/cycle	3.9	**3.9**	**3.9**	**3.9**	3.45	**3.45**	**3.45**	**3.45**	–	--	–	--	3.7	**3.7**
Blow pressure, psi	30	**30**	**30**	**30**	30	**30**	**30**	**30**	30	**30**	**30**	**30**	30	**30**
Max purge pressure, psi	45	**45**	**45**	**45**	45	**45**	**45**	**45**	45	**45**	**45**	**45**	45.0	**45.0**
Purge duration, sec	20	**20**	**20**	**20**	20	**20**	**20**	**20**	20	**20**	**20**	**20**	20.0	**20.0**
Ave.core machine cycle time, sec.	81.0	**61.0**	**61.0**	**58.0**	--	**61.0**	**59.0**	**64.0**	–	**62.0**	**85.0**	**84.0**	67.6	**67.6**
													Note 1	Note 1

Note 1: Report Averages included only validated test for which emission data are used in reporting a result

Average All included all tests even thought they may have been invalidated for a process or emission data reason

Note2: Mix test 13 was stopped prematurely. It will not be used.

APPENDIX C METHOD 25A CHARTS

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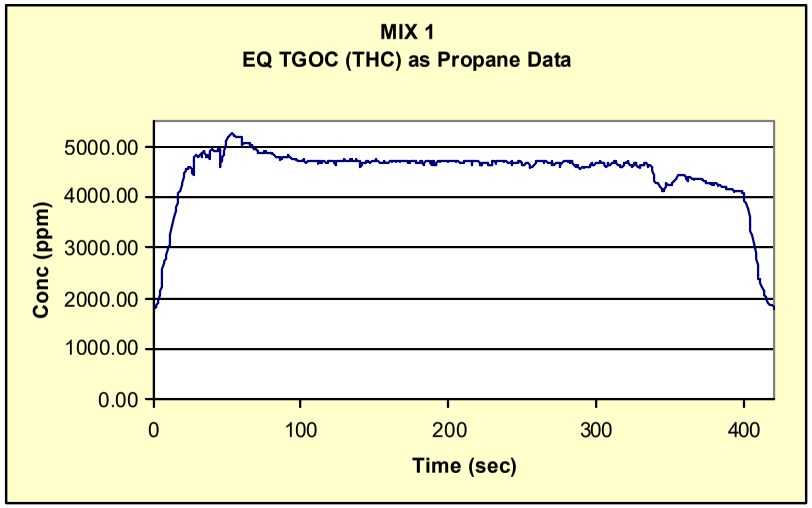
MIX 1
EQ TGOC (THC) as Propane Data
Conc (ppm)
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200
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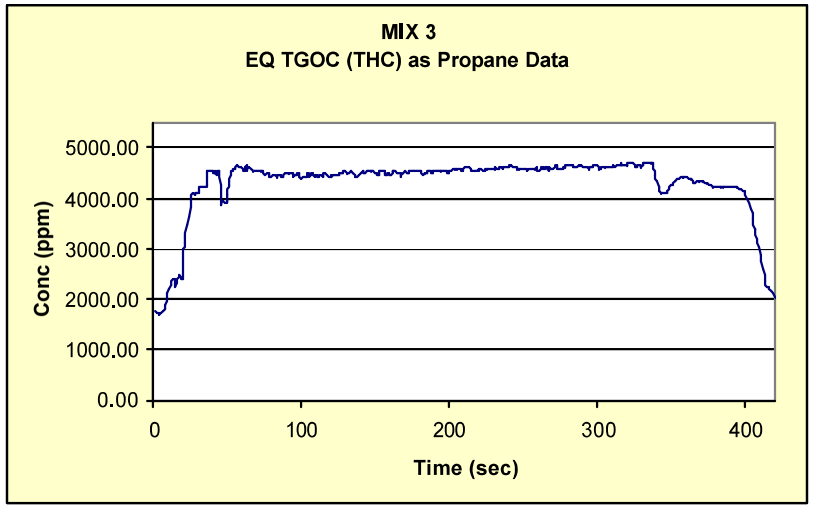
Time (sec)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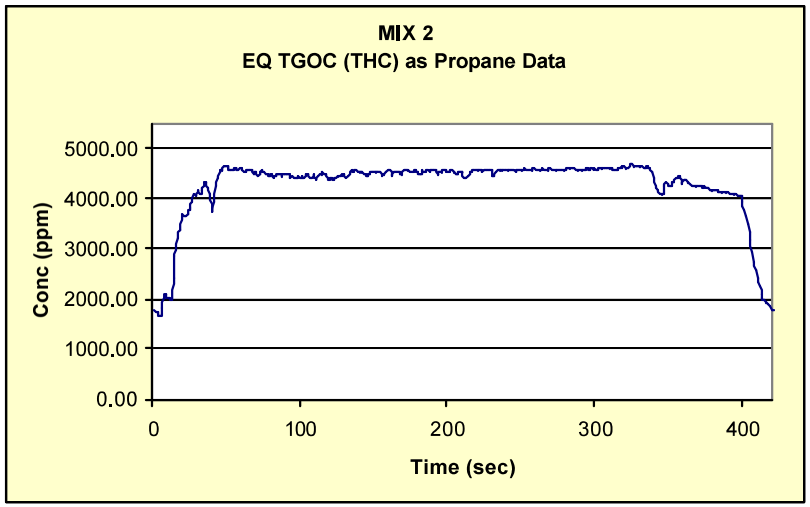
Time (sec)


MIX 2
EQ TGOC (THC) as Propane Data
Conc (ppm)
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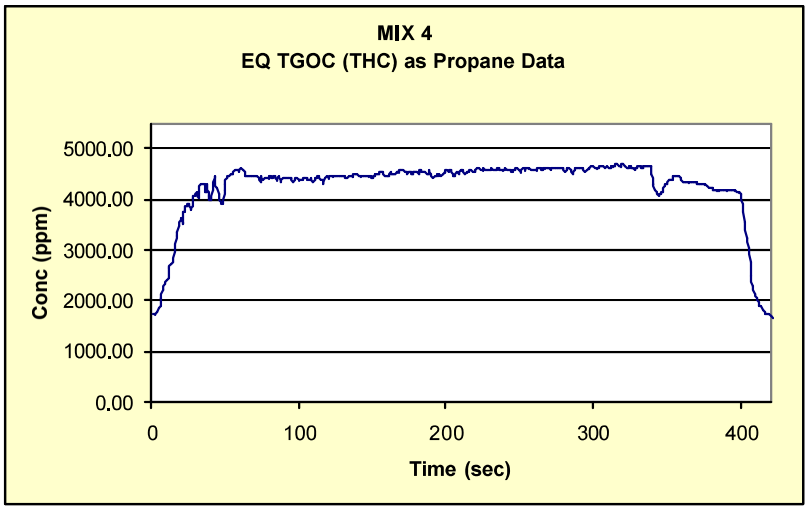
100
200
300
400
Time (sec)


MIX 4
EQ TGOC (THC) as Propane Data
Conc (ppm)
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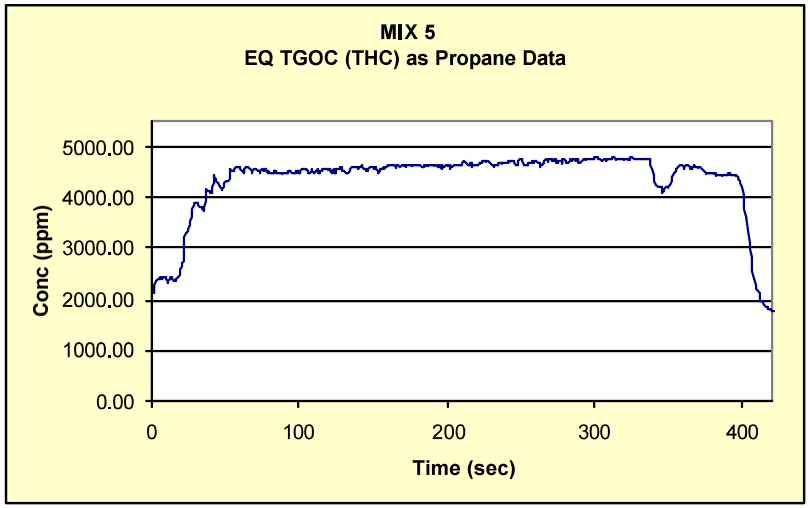
1000.00
0.00
0
100
200
300
400
Time (sec)


MIX 5
EQ TGOC (THC) as Propane Data
Conc (ppm)
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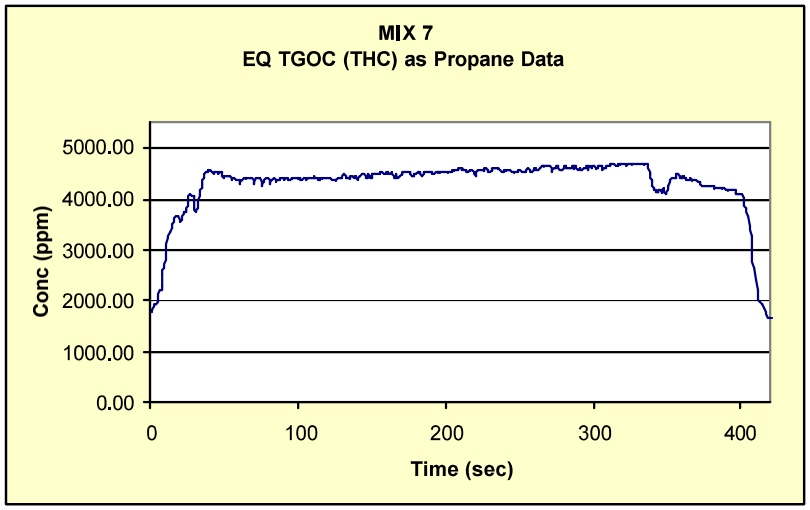
1000.00
0.00
0
100
200
300
400
Time (sec)


MIX 7
EQ TGOC (THC) as Propane Data
Conc (ppm)
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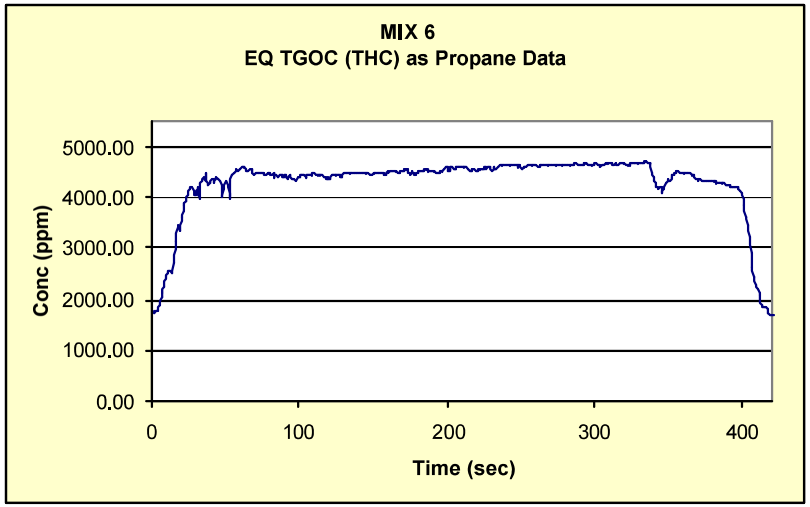
3000.00
2000.00
1000.00
0.00
0
100
200
300
400
Time (sec)


MIX 6
EQ TGOC (THC) as Propane Data
Conc (ppm)
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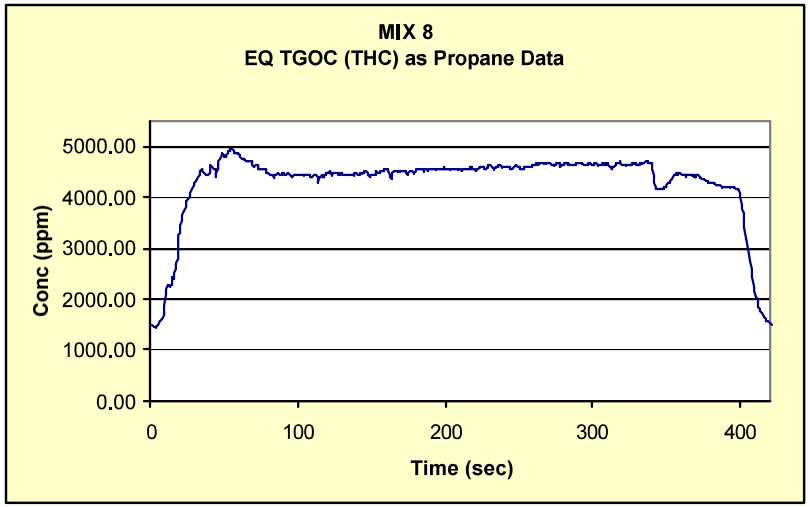
3000.00
2000.00
1000.00
0.00
0
100
200
300
400
Time (sec)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Conc (ppm)
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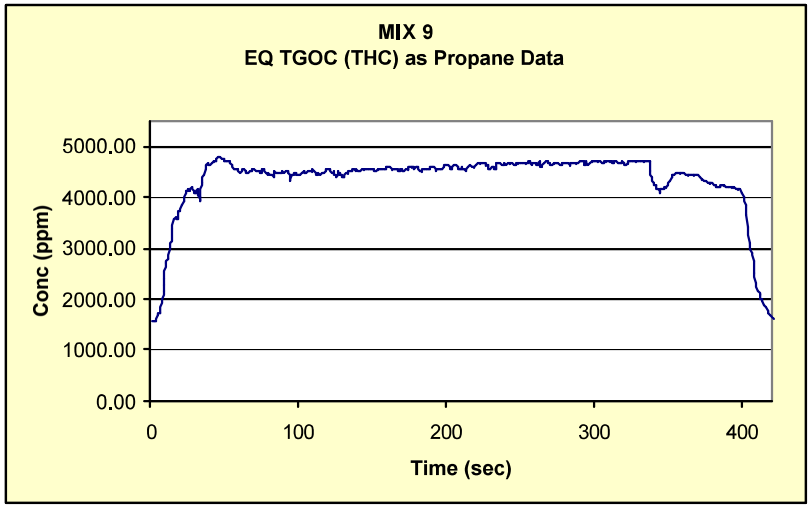
2000.00
1000.00
0.00
0
100
200
300
400
Time (sec)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Conc (ppm)
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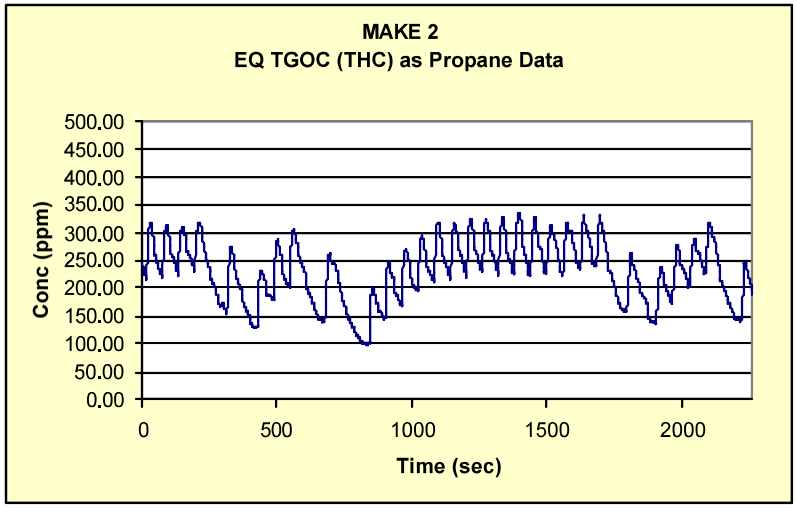
1000.00
0.00
0
100
200
300
400
Time (sec)


MAKE 2
EQ TGOC (THC) as Propane Data
Conc (ppm)
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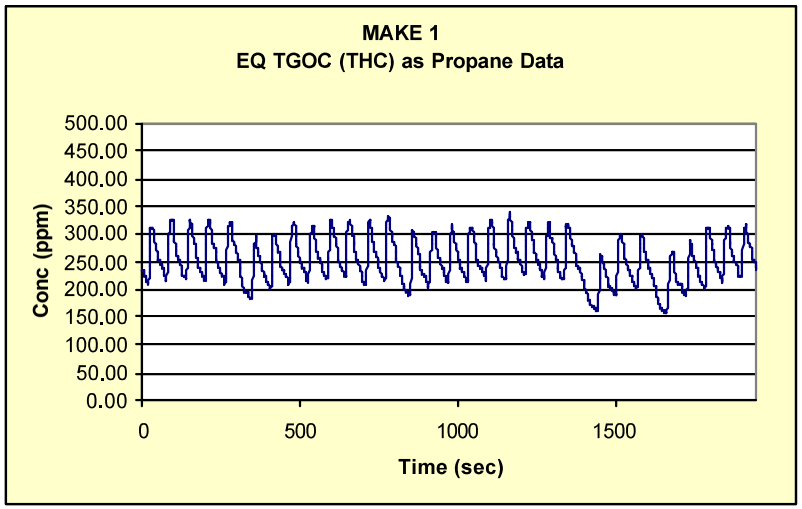
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
0
500
1000
1500
2000
Time (sec)


MAKE 1
EQ TGOC (THC) as Propane Data
Conc (ppm)
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400.00
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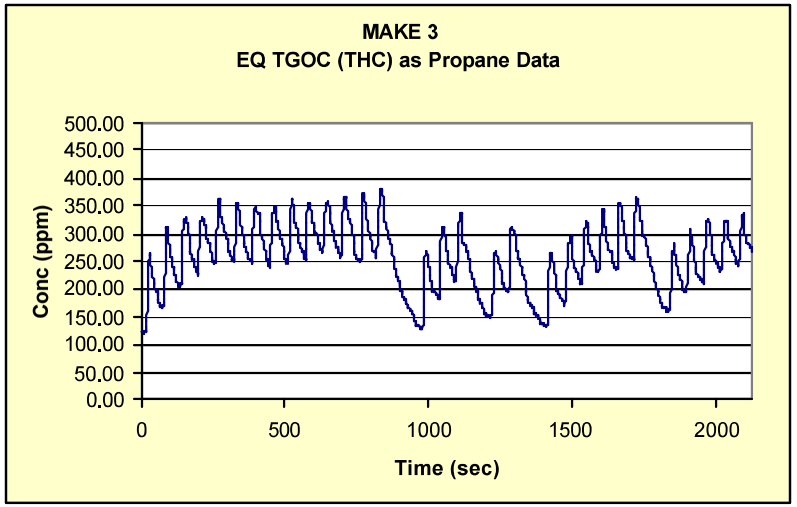
0.00
0
500
1000
1500
Time (sec)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EQ TGOC (THC) as Propane Data
Conc (ppm)
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150.00
100.00
50.00
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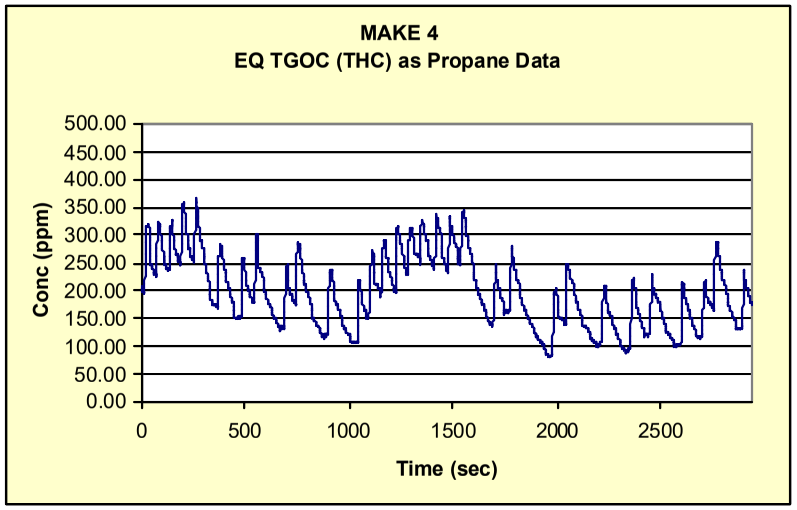
0
500
1000
1500
2000
Time (sec)


MAKE 4
EQ TGOC (THC) as Propane Data
Conc (ppm)
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400.00
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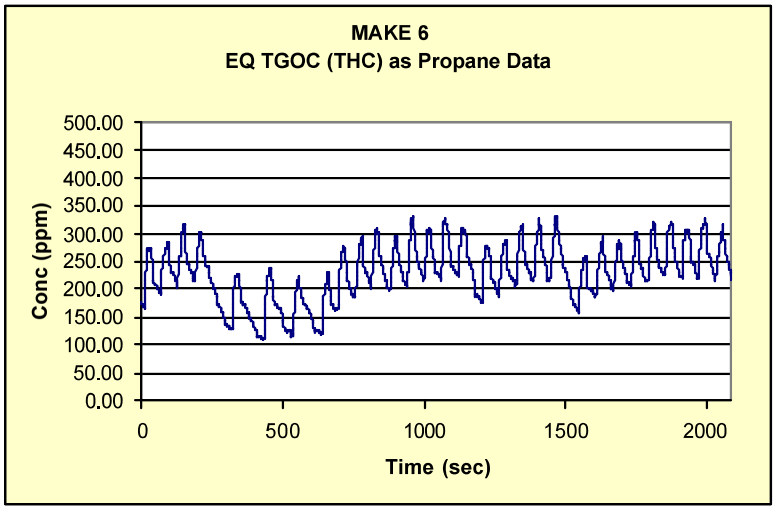
1500
2000
2500
Time (sec)


MAKE 6
EQ TGOC (THC) as Propane Data
Conc (ppm)
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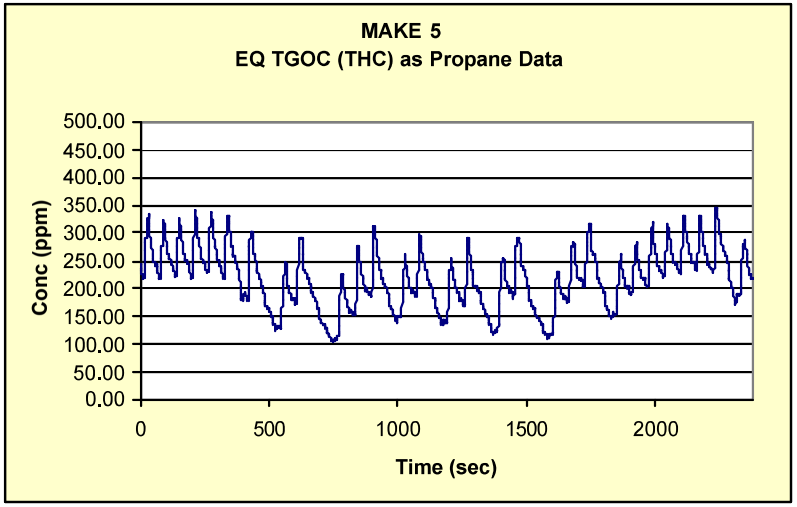
100.00
50.00
0.00
0
500
1000
1500
2000
Time (sec)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EQ TGOC (THC) as Propane Data
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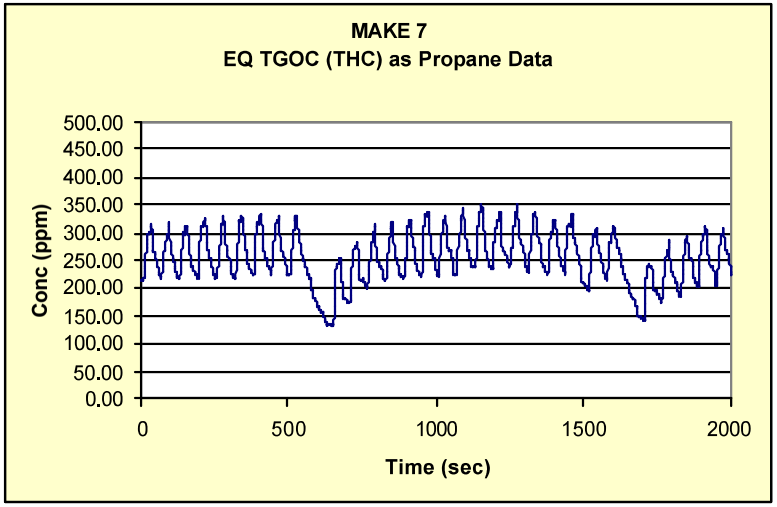
100.00
50.00
0.00
0
500
1000
1500
2000
Time (sec)


MAKE 7
EQ TGOC (THC) as Propane Data
Conc (ppm)
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150.00
100.00
50.00
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1500
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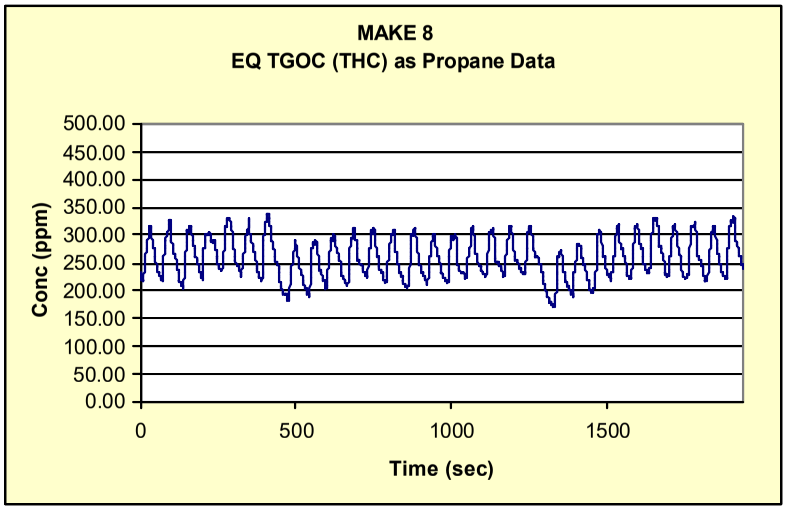
Time (sec)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0.00
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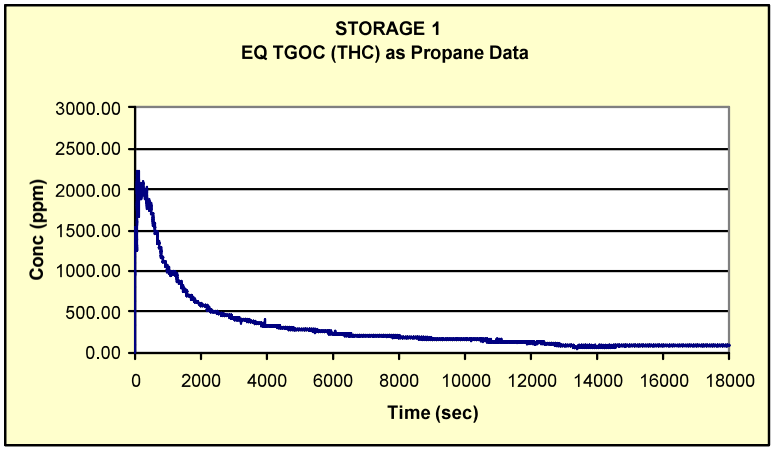
1000
1500
Time (sec)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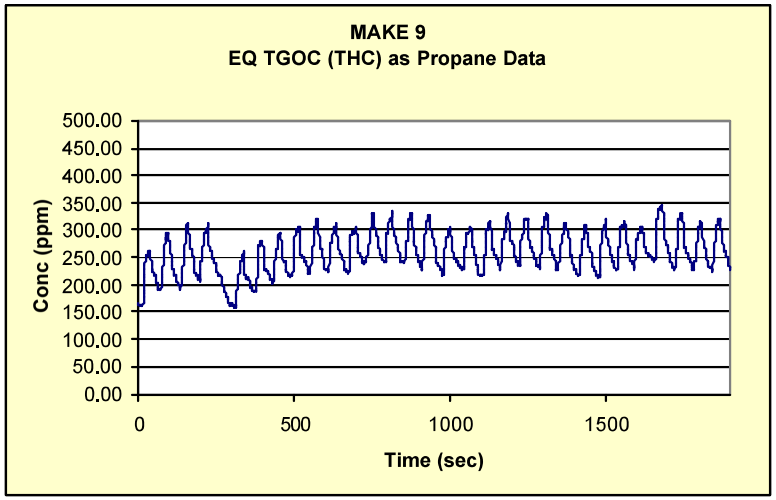
10000
12000
14000
16000
18000
Time (sec)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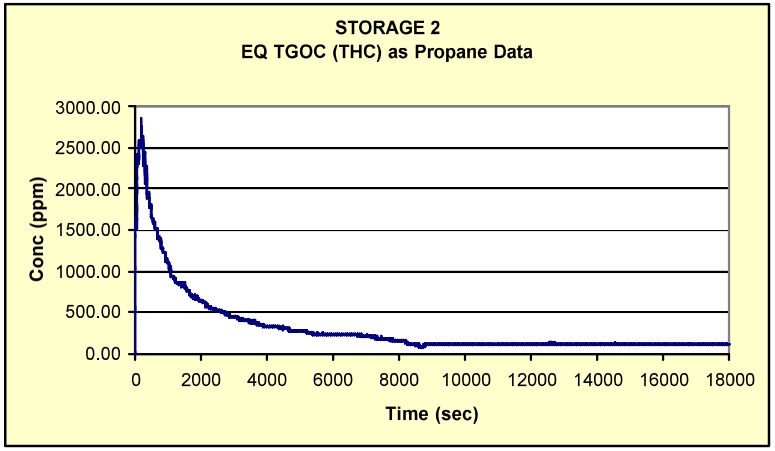
Time (sec)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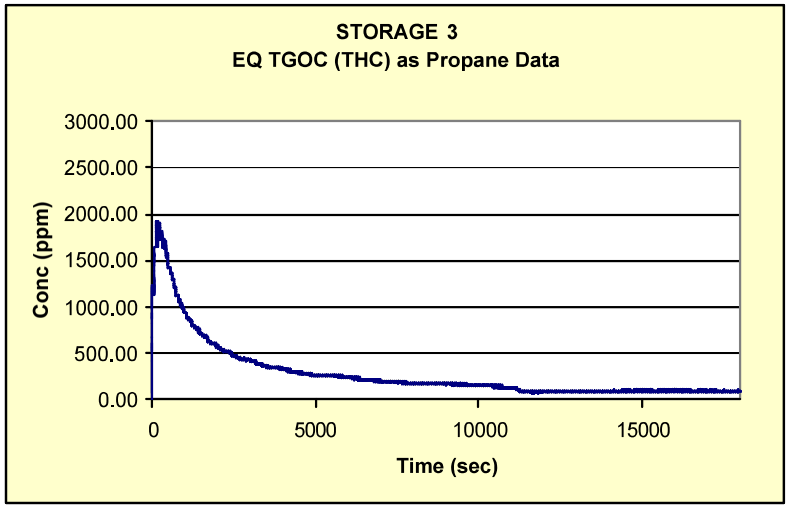
14000
16000
18000
Time (sec)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2000.00
1500.00
1000.00
500.00
0.00
Conc (ppm)
0
5000
10000
15000
Time (sec)

APPENDIX D GLOSSARY

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ND	Non Detect
NA	Not Applicable
HC as Hexane	Calculated by the summation of all area between elution of Hexane through the elution of Hexadecane. The quantity of HC is performed against a five-point calibration curve of Hexane by dividing the total area count from C6 through C16 to the area of Hexane from the initial calibration curve.
BOS	Based on Sand
Binder	Part 1 plus Part II

Pre-Production Test (DQ)
Test Plan #RE100112DQ

WBS # 1.3.1.1

20/80 Western/Southern Bentonite Clay Ratios

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Casting Emission Reduction Program

Prepared by:

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US Army Task N256

Pre-Production Air Emission Test Report

20/80 Western/Southern Bentonite Clay Ratios

Technikon #RE100114 DQ

25 April 2001

EPA United States Environmental Protection Agency

CISA

AFS AMERICAN FOUNDRY SOCIETY, INC.

USCAR UNITED STATES COUNCIL FOR AUTOMOTIVE RESEARCH

DAIMLERCHRYSLER Ford Motor Company General Motors

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Pre-production Air Emission Tests

20/80 Western/Southern
Bentonite Clay Ratios

CERP Test Plan #RE100112DQ

This report has been reviewed for completeness and accuracy and approved for release by the following:

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	William Walden	Date

The data contained in this report were developed to assess the relative emissions profile of the product or process being evaluated against a standardized baseline process profile. You may not obtain the same results in your facility. Data was not collected to assess casting quality, cost, or producibility

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Executive Summary

This report contains the results of testing conducted at the Technikon/CERP Pre-Production Foundry to establish a tap water reference against which the effects of advanced oxidant (AO) enriched water on the emissions from vented cored greensand molds may be investigated. Casting surface quality was not evaluated during these tests. This report provides results from a total of nine test plans (tests), with the first three tests performed to condition virgin sand and mold materials. Results are presented for all nine tests, and separately for the six post-conditioning tests. The approved test plan for this test series may be found in Appendix A of this document. Points of comparison between this and related AO studies have been **bolded**.

This report contains the results of emission testing at the Casting Emission Reduction Program (CERP) Pre-Production Foundry operated by Technikon LLC. The specific objective of Test Plan DQ was to determine the emission reductions, if any, of organic Hazardous Air Pollutants (HAPs) and Volatile Organic Compounds (VOCs) for a vented **tap water** tempered virgin greensand mold utilizing a **20/80** Western to Southern bentonite clay ratio and Seacoal. The core package consisted of organic free sodium silicate cores so that the only known mold organic was Seacoal. The test results may be compared to Pre-Production Tests DR, and DT that also utilize a vented **tap water** tempered virgin greensand mold with Seacoal, and bentonite clay ratios of **50/50** and **80/20** Western to Southern respectively. In addition, test results may be compared to Pre-Production Tests DA, DS, and DU that are duplicates of DQ, DR, and DT, except that they utilize **advanced oxidation (AO) treated water** additions instead of tap water.

The Pre-production Foundry is a simple general purpose manual foundry that was adapted and instrumented to make detailed organic emission measurements, using methods based on EPA protocols for pouring, casting cooling, and shakeout processes on discrete mold and core packages. The measurements are conducted under tightly controlled conditions not feasible in a commercial foundry. It is the initial step in the schema of evaluating a new product or process for the foundry industry. The results of testing in the Pre-production Foundry are evaluated to determine whether further testing in the Technikon Production Foundry is warranted.

The testing performed involved the collection of continuous air samples over a seventy-five minute period, including the mold pouring, cooling, shakeout, and post shakeout periods. Process and stack parameters were measured and include: the weights of the casting, mold, core binder, and core; Loss on Ignition (LOI) values for the mold prior to the test and at shakeout; percent clays; metallurgical data; and stack temperature, pressure, volumetric flow rate and moisture content. The process parameters were maintained within prescribed ranges in order to ensure the reproducibility of the tests. Nine (9) individual sampling events were conducted for test plan DQ. Three tests were utilized to condition the sand to the tap water, based on historical data, and six tests were utilized for the actual test.

Samples were collected and analyzed for a limited list of twenty (20) target compounds using procedures based on US EPA Method 18. Continuous monitoring of the Total Gaseous Organic Concentration (TGOC), formerly Total Hydrocarbon Content (THC), of the emissions was conducted according to US EPA Method 25A. Finally, the "condensable" organic material in the

emissions was determined using a Technikon developed procedure. The "condensables" represent the "back half" catch from US EPA Method 5.

The mass emission rate of each parameter or target compound was calculated, in pounds per ton of metal, using the Method 25A data or the laboratory analytical results, the measured source data, and the weight of each casting. Results for structural isomers have been grouped and reported as a single entity. For example, ortho-, meta-, and para-xylene are the three (3) structural isomers of dimethyl benzene. Several "emissions indicators," in addition to the TGOC (THC) as Propane, were also calculated. The HC as Hexane results represent the sum of all organic compounds detected and expressed as Hexane. All of the following sums are sub-groups of this measure. The "Sum of VOCs" is based on the sum of the individual target VOCs measured and includes the HAPs and Polycyclic Organic Material (POMs) listed in the Clean Air Act Amendments of 1990. The "Sum of HAPs" is the sum of the individual target HAPs measured and includes the POMs. Finally, the "Sum of POMs" is the sum of all of the polycyclic organic material measured. Results for the emission indicators, for all nine-test runs, and for the six post-conditioning test runs, are shown in the following table. All results are measured as pounds emitted per ton of metal.

Number of Tests Included	**TGOC (THC) As Propane**	**HC as Hexane**	**Sum of VOCs**	**Sum of HAPs**	Sum of POMs
6	2.136	0.6072	0.2093	0.1881	ND
9	2.459	0.6435	0.2356	0.2127	ND

Due to the fact that the results expressed here are sums derived from a set of approximately 20 analytes, they are comparable only to test series utilizing an equivalent analyte list. All test series performed for the AO water/Tap water, clay ratio studies will utilize this analyte list, and are therefore comparable. But they cannot be compared to similarly titled results from test series in which an analytes list of greater than 70 compounds have been used to generate the data.

In addition, it must be noted that the reference and product testing performed is not suitable for use as general emission factors or for purposes other than evaluating the relative emission reductions associated with the use of alternative materials, equipment, or processes. The emissions measurements are unique to the specific castings produced, materials used, and testing methodology associated with these tests, and should not be used as the basis for estimating emissions from actual commercial foundry applications.

1.0 Introduction

1.1 Background

Technikon LLC is a privately held contract research organization located in McClellan, California, a suburb of Sacramento. Technikon offers emissions and process research services to industrial and government clients specializing in the metal casting and mobile emissions areas. Technikon also operates the Casting Emission Reduction Program (CERP). CERP is a cooperative initiative between the Department of Defense (US Army) and the United States Council for Automotive Research (USCAR). Its purpose is to evaluate alternative casting materials and processes that are designed to reduce air emissions and/or produce more efficient casting processes. Other technical partners directly supporting the project include: the American Foundry Society (AFS); the Casting Industry Suppliers Association (CISA); the US Environmental Protection Agency (USEPA); and the California Air Resources Board (CARB). Each of these partners is represented on a Steering Committee (as voting or non-voting members) that has oversight for the CRADA testing conducted at the Technikon facility.

1.2 CERP Objectives

The primary objective of CERP program is to evaluate materials, equipment, and processes used in the production of metal castings. The Technikon facility was designed to evaluate alternate materials and production processes designed to achieve significant air emission reductions, especially for the 1990 Clean Air Act Amendment organic Hazardous Air Pollutants (HAP). The facility has two principal testing arenas: a Pre-production Foundry designed to measure airborne emissions from individually poured molds, and a Production Foundry designed to measure air emissions in a continuous full scale production process. Each of these testing arenas has been specially designed to facilitate the collection and evaluation of airborne emissions and associated process data. The data collected during the various testing projects are evaluated to determine both the airborne emissions impact of the materials and/or process changes, and their stability and impact upon the quality and economics of casting and core manufacture. The materials, equipment, and processes may need to be further adapted and defined so that they will integrate into current casting facilities smoothly and with minimum capital expenditure.

Normally, Pre-production testing is conducted first in order to evaluate the air emissions impact of a proposed alternative material, equipment, or process in the most cost effective manner. The Pre-production Foundry is a simple general purpose manual foundry that was adapted and instrumented to make detailed emission measurements using methods based on EPA protocols for pouring, casting cooling, and shakeout processes on discrete mold and core packages under tightly controlled conditions not feasible in a commercial foundry. The Pre-production Foundry uses an eight-cavity, bottom feed AFS step block as its test mold pattern.

The Production Foundry's design as a basic greensand foundry was deliberately chosen so that whatever is tested in this facility will also be convertible to existing mechanized commercial foundries. The type and size of equipment, materials, and processes used emulate an automotive foundry. This facility is used to evaluate materials, equipment, and processes in a continuous process that is allowed to vary to the limits of commercial experience in a controlled manner.

The Production Foundry provides simultaneous detailed individual emission measurements using methods based on USEPA protocols of the melting, pouring, sand preparation, mold making, and core making processes. It is instrumented so that the data on all activities of the metal casting process can be simultaneously and continuously collected, in order to completely evaluate the economic impact of the prospective emission reducing strategy. The Production Foundry's test casting is a single cavity Ford Motor Company I-4 engine block. Castings are randomly selected to evaluate the impact of the material, equipment, or process on casting quality. Alternative materials, equipment, and processes that demonstrate significant air emission reduction potential, preserve casting quality parameters, and that are economically viable based on the Pre-production testing, may be further evaluated in the Production Foundry.

It must be noted that the results from the reference and product testing performed are not suitable for use as general emission factors or for other purposes other than evaluating the relative emission reductions associated with the use of alternative materials, equipment, or manufacturing processes. The emissions measurements are unique to the specific castings produced, materials used, and testing methodology associated with these tests.

1.3 Report Organization

This report has been designed to document the methodology and results of a specific test plan that was used to evaluate the performance of an alternative material, equipment, or process in the Pre-production Foundry. Section 2 of this report includes a summary of the methodologies used for data collection and analysis, emission calculations, QA/QC procedures, and data management and reduction methods. Specific data collected in support of these tests are summarized in Section 3 of this report, with detailed data included in Appendices B and C of this report. Section 4 of this report contains a discussion of the results along with conclusions and recommendations.

The raw data for this test series are included in a data binder that is maintained at the Technikon facility. There are several support documents that provide details regarding the testing and analytical procedures used. Appendix F contains a listing of these support documents.

1.4 Preliminary Testing

The foundation for the specific test protocols and airborne emission measurements have been determined from testing performed to:

?? Establish the required number of samples needed to statistically support the evaluation of emission reduction potentials of the alternative materials, equipment, and processes that may be evaluated;

?? Provide a series of standardized emissions from standard mold and core packages.

It has been determined that nine replicate tests will provide a statistically significant sample for the purposes of evaluating the emission reductions from alternative materials, equipment, and processes. The results of the testing conducted in support of this conclusion is included in a report entitled Evaluation of the Required Number of Replicate Tests to Provide Statistically

Significant Air Emission Reduction Comparisons for the CERP Pre-production Foundry Test Program.

Appendix A of this report contains the Test Plan for Test Series DQ.

Appendix B of this report contains detailed test results for Test Series DQ.

1.5 Specific Test Plan and Objectives

This report contains the results of testing performed to assess the emission reductions, if any, of organic Hazardous Air Pollutants (HAPs) and Volatile Organic Compounds (VOCs) for a tap water treated virgin greensand mold utilizing a 20/80 Western to Southern bentonite clay ratio and Seacoal. The core package consists of organic free sodium silicate cores so that the only known mold organic is Seacoal.

The results from test DQ will provide comparative data to Pre-production Tests DR and DT, which are also tap water tempered greensand molds with Seacoal, but with bentonite clay ratios of 50:50 and 80:20 Western to Southern, respectively. Test DQ will also provide a tap water reference for comparison to three additional Test Series, DA, DS, and DU, where advanced oxidation (AO) treated water additions were substituted for tap water in molds containing each of the three clay ratios listed above.

Table 1-1 provides a summary of the Test Plan. The detail of the approved test plan is included in Appendix A.

Table 1–1 Test Plan Summary

	Test Plan
Type of Process tested	20/80 Western to Southern Clays w/ Tap Water
Test Plan Number	RE 1 00112 DQ
Mold Type	Hand Rammed Greensand
Core Type	Organic Free Sodium Silicate
Casting Type	Eight-cavity bottom feed AFS step block
Baseline Comparison	Greensand
Number of molds poured	6 (9 including conditioning runs)
Test Dates	12/13/00, 12/14/00, 12/18/00
Emissions Measured	20 organic HAPs and VOCs
Process Parameters Measured	Total Casting, Mold and Core Weights, Metallurgical data, Mold and Core Component Weights, % LOI (mold and core), % Clay, Stack Temperature, Stack Moisture Content, Stack Pressure, and Stack Volumetric Flow Rate

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2.0 Test Methodology

2.1 Description of Process and Testing Equipment

The following figure is a diagram of the Pre-production Foundry process equipment.

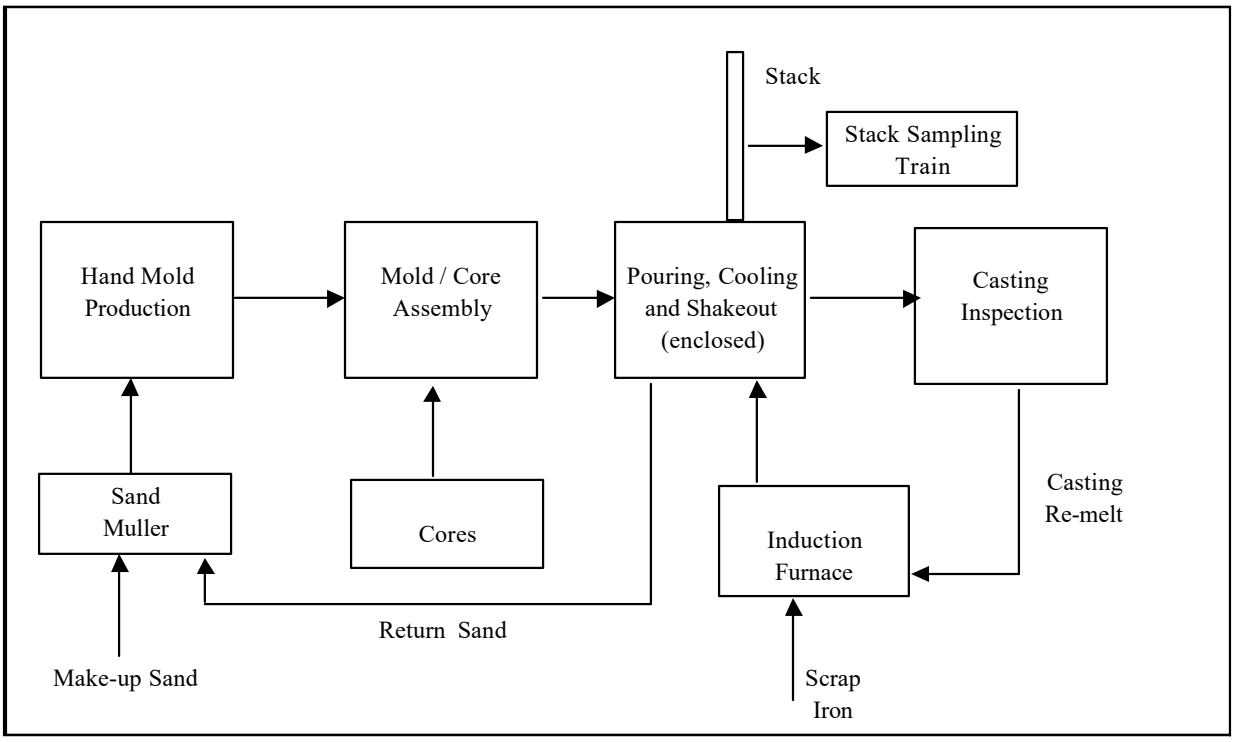

Figure 2-1 Pre-production Foundry Layout Diagram

2.2 Description of Testing Program

The specific steps used in this sampling program are summarized below:

1. **Test Plan Review and Approval:** The proposed test plan was reviewed by the Technikon staff and CTC Program Manager, and approved.

2. **Mold, Core and Metal Preparation:** The molds and cores are prepared to a standard composition by the CERP production team. The cores are made either by hand (if sodium silicate) or blown by a Redford core blower, and relevant process data are collected. If new core processes are being tested, the cores are placed in new lake sand/clay/water molds. If new mold binder systems or processes are being evaluated, organic free sodium silicate step cores are placed into the molds. Iron is melted in a 1000 lb. Ajax induction furnace (Model MFB-1000). The amount of metal melted is determined from the poured weight of the casting and the number of molds to be poured. The metal composition is prescribed by a

metal composition worksheet. The weight of metal poured into each mold is recorded on the process data summary sheet.

Setting of Step Cores in Mold

3. **Individual Sampling Events:** Replicate tests are performed on nine mold/core packages. The mold/core packages are placed into an enclosed test stand. Iron is poured through an opening in the top of the enclosure. The opening is closed as soon as pouring is completed. Continuous air samples are collected during the forty-five minute pouring and cooling process, during the fifteen minute shakeout of the mold, and for an additional fifteen minute period following shakeout. The total sampling time is seventy-five minutes.

Pouring of Step Core Molds Through Opening in Collection Hood

The finished castings are cleaned and quality checks of the castings are performed. Additional tests may be required for new mold materials with the molding sand being recycled into new molds to evaluate the long-term effects on molding sand properties.

The weights of the molds, cores, Seacoal additions, and binder are recorded for each mold on the Process Data Summary Sheet. In addition, the pouring temperature, number of cavities poured, the %LOI and the % clays of the mold before pouring and at shakeout, and the % LOI of the core are recorded on the Process Data Summary Sheet.

The unheated emission hood is ventilated at approximately 700 SCFM through a 12-inch diameter heated duct. Emissions samples are drawn from a sampling port located to ensure conformance with EPA Method 1. The tip of the probe is located in the centroid of the duct. The samples are collected at a constant rate in adsorption tubes (test sample and duplicate sample).

Castings on the Shake Out Deck

4. **Process Parameter Measurements:** Table 2-1 lists the process parameters that are monitored during each test. The analytical equipment and methods used are also listed.

Table 2-1 Process Parameters Measured

Parameter	Analytical Equipment and Methods
Core Weight	Mettler PJ8000 Digital Scale (Gravimetric)
Mold Weight	Acme 4260 Crane Scale (Gravimetric)
Casting Weight	Westweigh PP2847 Platform Scale (Gravimetric)
Seacoal Weight	Toledo PAC-DPC-606050 balance (Gravimetric)
Binder Weight	Mettler PJ8000 Digital Scale (Gravimetric)
Volatiles	Mettler Pb302 Scale (AFS procedure 212-87-S)
LOI, % at mold and shakeout	Denver Instruments XE-100 Analytical Scale (AFS procedure 212-87-S)
Core LOI, %	Denver Instruments XE-100 Analytical Scale (AFS procedure 321-87-S)
Clay, % at mold and shakeout	Dietert 535A MB Clay Tester (AFS Procedure 210-89-S)
Metallurgical Parameters	
Pouring Temperature	Electro-Nite DT 260 (T/C immersion pyrometer)
Carbon/Silicon Fusion Temperature	Electro-Nite Datacast 2000 (Thermal Arrest)
Alloy Weights	Ohaus MP@
Mold Compactability	Dietert 319A Sand Squeezer (AFS procedure 221-87-S)
Carbon/Silicon	Baird Foundry Mate Optical Emissions Spectrometer

5. **Emissions Measurement:** The specific sampling and analytical methods used in the Pre-production Foundry tests are based on the USEPA reference methods shown in Table 2-2. The details of the specific testing procedures and their variance from the reference methods are included in the Emissions Testing and Analytical Testing Standard Operating Procedures.

Table 2-2 Sampling and Analytical Methods

Measurement Parameter	Test Method
Port location	EPA Method 1
Number of traverse points	EPA Method 1
Gas velocity and temperature	EPA Method 2
Gas density and molecular weight	EPA Method 3a
Gas moisture	EPA Method 4, gravimetric
HAPs concentration	EPA Method 18, TO11, NIOSH 2002*
VOCs analysis	EPA Method 18, 25A, TO11, NIOSH 2002*
Condensables	Technikon developed method**

*These methods were specifically modified to meet the testing objectives of the CERP Program.
**The Technikon condensables method is intended to provide a measure of the EPA Method 5 "back-half" determination.

6. **Data Reduction, Tabulation and Preliminary Report Preparation:** The analytical results of the emissions tests provide the mass of each analyte in the sample. The total mass of the analyte emitted is calculated by multiplying the mass of analyte in the sample times the ratio of total stack gas volume to sample volume. The total stack gas volume is calculated from the measured stack gas velocity and duct diameter, and corrected to dry standard conditions using the measured stack pressures, temperatures, gas molecular weight, and moisture content. The total mass of analyte is then divided by the weight of the casting poured to provide emissions data in pounds of analyte per ton of metal.

   The results for each sampling event are included in Appendix B of this report. The results for each test are also averaged and are shown in Table 3-1.

7. **Report Preparation and Review:** The Preliminary Draft Report is reviewed by the Process Team and Emissions Team to ensure its completeness, consistency with the test plan, and adherence to the prescribed QA/QC procedures. Appropriate observations, conclusions and recommendations are added to the report to produce a Draft Report. The Draft Report is reviewed by the Vice President-Measurement Technologies, the Vice President-Operations, and the Technikon President. Comments are incorporated into a Final Report that is circulated for signatures and then distributed.

2.3 Quality Assurance and Quality Control (QA/QC) Procedures

Detailed QA/QC and data validation procedures for the process parameters, stack measurements, and laboratory analytical procedures are included in the CERP Standard Operating Procedures. In order to ensure the timely review of critical quality control parameters, the following procedures are followed:

- Immediately following the individual sampling events performed for each test, specific process parameters are reviewed by the Manager - Process Engineering to ensure that the parameters are maintained within the prescribed control ranges. Where data are not within the prescribed ranges, the Manager - Process Engineering and the Vice President-Operations determine whether the individual test samples should be invalidated or flagged for further analysis following review of the laboratory data.

- The source (stack) and sampling parameters, analytical results and corresponding laboratory QA/QC data are reviewed by the Emissions Measurement Team to confirm the validity of the data. The VP-Measurement Technologies reviews and approves the recommendation, if any, that individual sample data should be invalidated. Invalidated data are not used in subsequent calculations.

3.0 Test Results

The average emission result, in pounds per ton of metal poured, is presented in Table 3-1 for tests reported in this document. This table includes all the individual organic HAP compounds that comprise the reduced analyte list for this test series, along with the corresponding sum of VOCs, sum of HAPs, and sum of POMs. The table also includes the TGOC (THC) as Propane and HC as Hexane. Figures 3-1a through 3-1f present the five emissions indicators and individual HAP emissions data from Tables 3-1 in graphical form. Appendix B contains the detailed data including the results for all analytes measured. Table 3-2 includes the averages of the key process and source parameters and the data target ranges. All emission results are presented without blank or background correction. Detailed process and source data are presented in Appendix C.

Method 25A charts for the tests are included in Appendix D of this report. The charts are presented to show the VOC profile of emissions for each pour.

The log used during validation of the laboratory data is maintained in the Technikon offices.

Table 3-1 Test Series DQ Summary of Individual Test Results – Lbs/Ton of Metal

COMPOUND / SAMPLE NUMBER	Six Mold Average (Lb/tn)	Nine Mold Average (Lb/tn)
TGOC (THC) as Propane	2.136	2.459
HC as Hexane	0.6072	0.6435
Sum of VOCs	0.2093	0.2356
Sum of HAPs	0.1881	0.2127
Sum of POMs	ND	ND
Individual Organic HAPs		
Benzene	0.0891	0.1051
Toluene	0.0503	0.0547
Xylene (Total)	0.0371	0.0403
Ethylbenzene	0.0061	0.0068
Acetaldehyde	0.0055	0.0059
1-Methylnaphthalene	NA	NA
2-Methylnaphthalene	NA	NA
Naphthalene	NA	NA
Aniline	I	I
Phenol	I	I
Other VOCs		
Octane	0.0101	0.0117
1,2,4-Trimethylbenzene	0.0111	0.0113
Other Analytes		
Condensables	0.2147	0.2324
Carbon Monoxide	5.241	5.241
Methane	1.497	1.497
Carbon Dioxide	23.71	23.71

I: Data was rejected based on data validation considerations
All "Other Analytes" are not included in the sum of HAPs or VOCs

N/A: Not Applicable

Figure 3-1a Test DQ – Emission Indicators – Average of 9 Molds

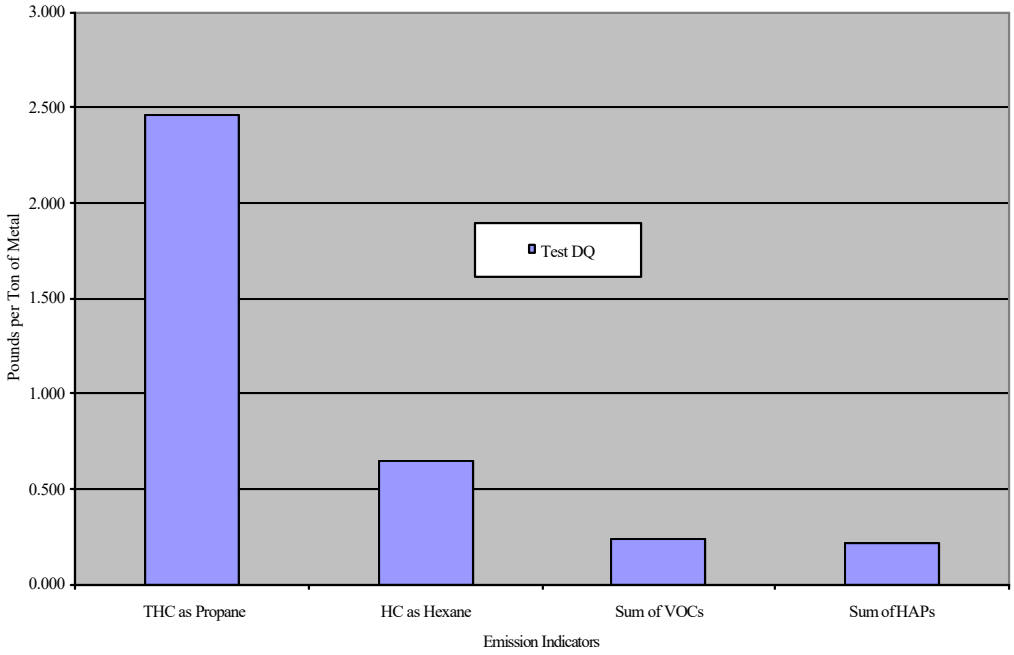

Figure 3-1b Test DQ – Emission Indicators – Average of 6 Molds

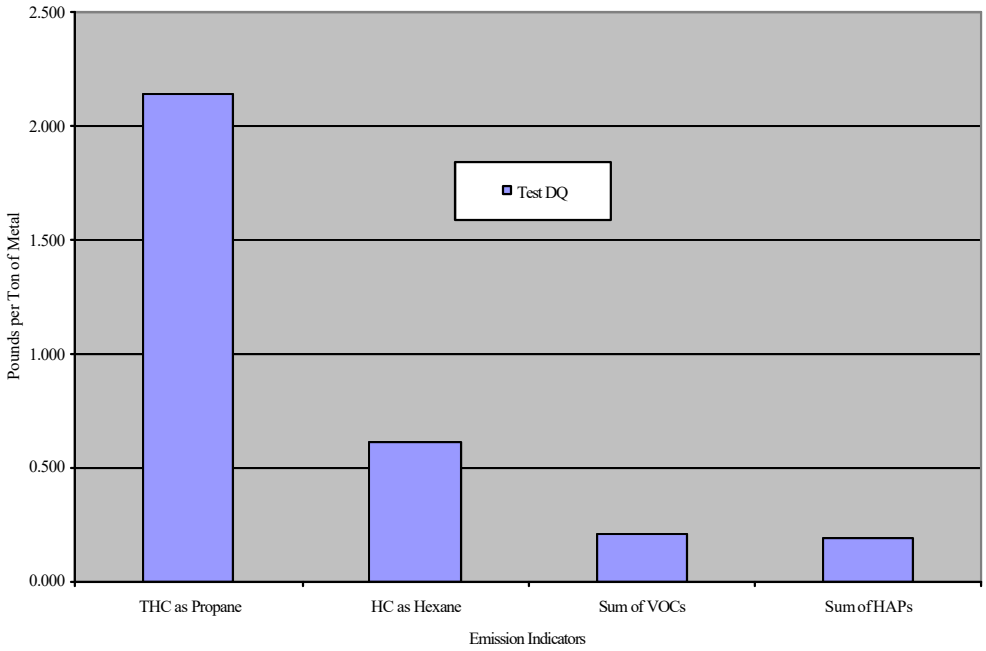

Figure 3-1c Test Series DQ – Comparison of Emission Indicators

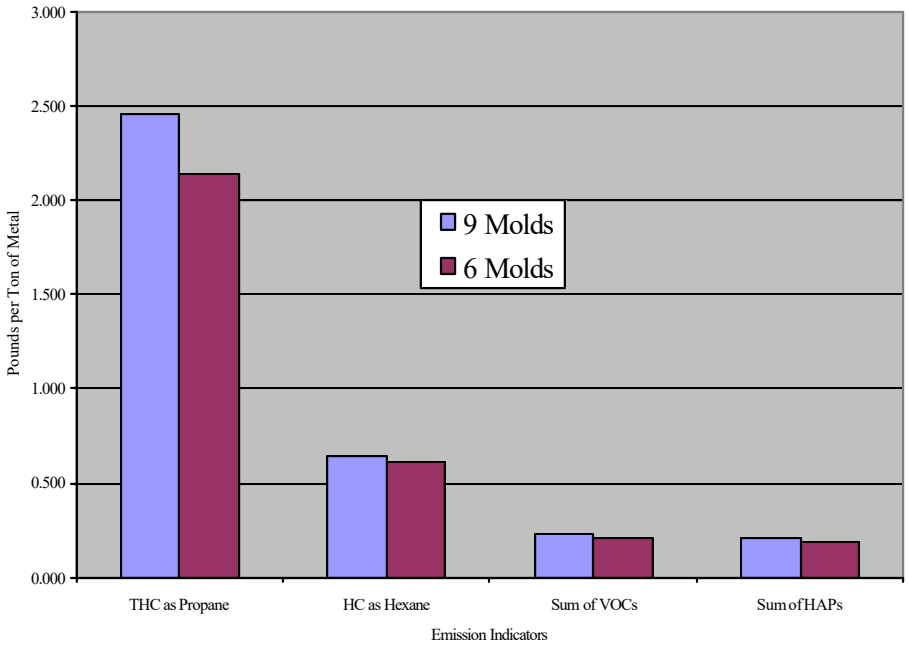

Figure 3-1d Test DQ – Selected HAPs – Average of 9 Molds

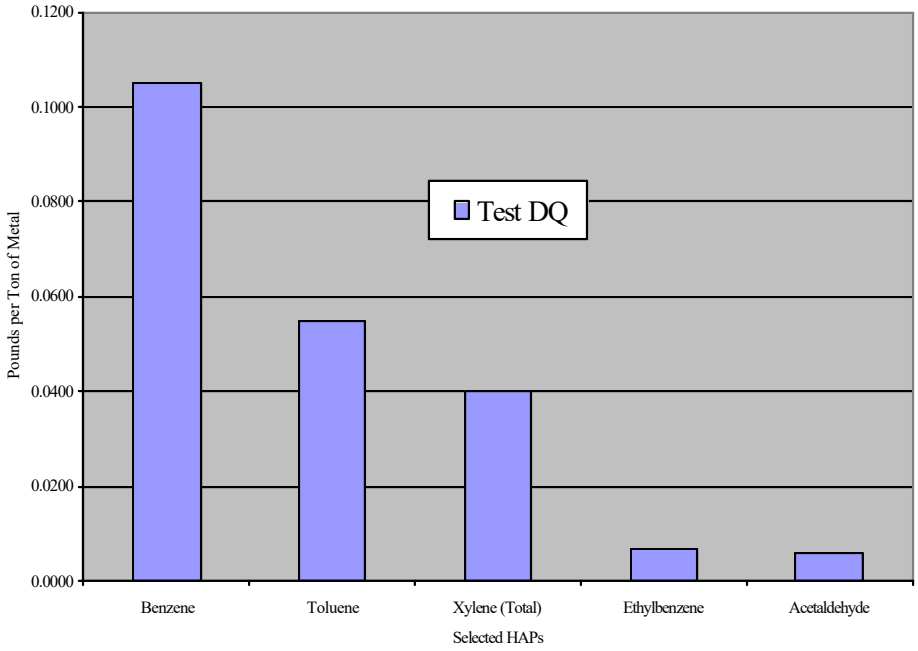

Figure 3-1e Test DQ – Selected HAPs – Average of 6 Molds

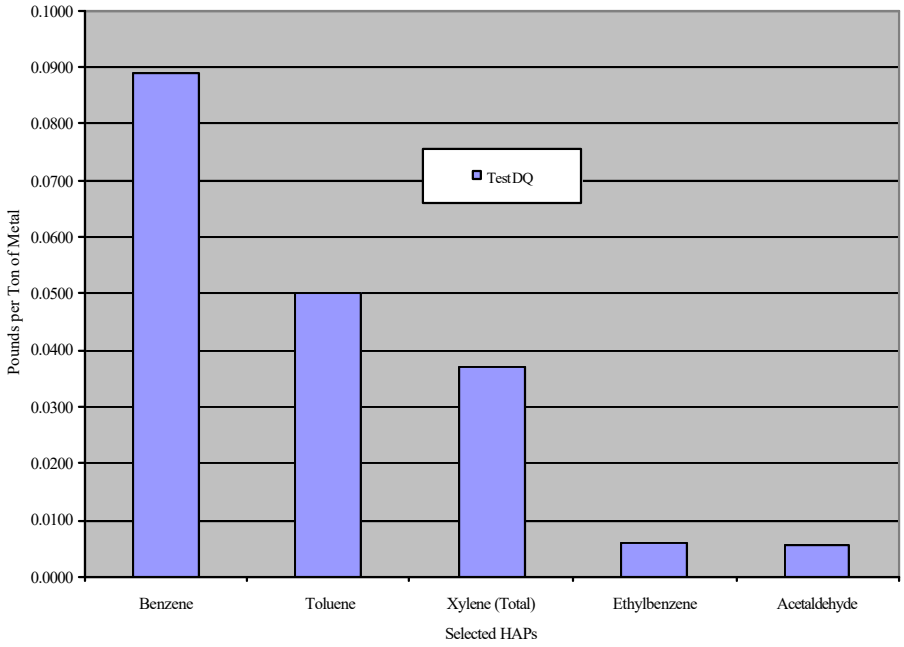

Figure 3-1f Test Series DQ – Comparison of Selected HAPs

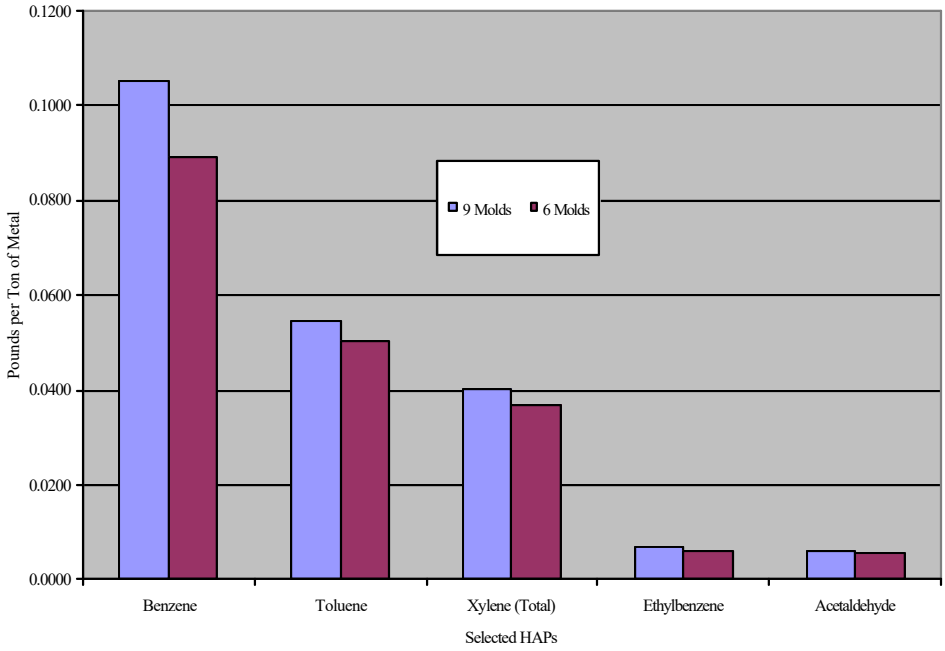

Table 3-2 Test Plan DQ - Average Process and Stack Parameters

Average Process and Stack Parameters	Average of DQ	Target Range
Casting Metal Weight, lbs.	252	240 - 250
Total Mold Weight, lbs.	1348	1350 - 1420
Total Core Weight, lbs.	59.71	58 - 60
Compactability, %	42	45 - 51
Total Binder Weight, lbs	2.84	2.8 - 3.1
Core Ratio Resin (part I) to co-reactant (part II)	N/A	N/A
Greensand mold LOI, % @ 1800°F	4.97	4.4 – 5.0
MB Clay, %	6.43	6.5 - 7.5
Core LOI, % @ 1400°F	0.62	0.2 - 0.8
Greensand Mold Volatiles, % @ 900° F	0.97	N/A
Pour Temperature, °F	2634	2620 - 2640
Mold green compressive strength, psi	13.79	8 – 15
Core Binder Content, %	4.76	4.9 - 5.1
Water Type used in Mold	Tap	Tap
Average Stack Temperature, °F	108	120 ± 20
Total Moisture Content, %	1.57	0-4
Average Stack Velocity, ft./sec.	15.89	17 ± 2
Avg. Stack Pressure, in. Hg	30.21	29.92 ± 1
Stack Flow Rate, scfm	692	700 ± 50

4.0 Discussion of Results

A selected analyte list was utilized in the analysis of stack emissions from Test Series DQ. The results for the sum of HAPs, VOCs, and POMs that are derived from this list can therefore only be compared to other test series that also utilize this reduced list. The sampling and analytical methodologies were the same for Tests DQ, DA, DR, DS, DT, and DU, so comparison of these six test series will allow the effects of advanced oxidation treatment to be evaluated against tap water for three different ratios of western/southern bentonite clays, 20/80, 50/50, and 80/20.

Two methods were employed to measure undifferentiated hydrocarbon emissions, TGOC (THC) as propane, performed in accordance with EPA Method 25A, and HC as hexane. EPA Method 25A, TGOC (as propane), is weighted to the detection of more volatile hydrocarbon species, beginning at C1 (methane), with results calibrated against a three-carbon alkane (propane). HC as hexane is weighted to detection of relatively less volatile compounds. This method detects hydrocarbon compounds in the alkane range between C6 and C16, with results calibrated against a six-carbon alkane (hexane).

TGOC results for the six post-conditioning molds exceeded HC as Hexane by a factor of approximately 3.5. When the three conditioning molds are added to the average results for these two analyses, TGOC exceeds HC as Hexane by a factor of almost 4. Average TGOC results decreased by 13% when only post-conditioning molds are considered, while HC as hexane results decreased by 5.5%.

Phenol and aniline were included in the selected analyte list, but results have not been incorporated due to sampling difficulties for the NIOSH 2002 method. Results for these analytes will be included in the comparative tests listed in the first paragraph.

Observation of measured process parameters indicates that the tests were run within an acceptable range.

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APPENDIX A APPROVED TEST PLAN FOR TEST SERIES DQ

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CERP TEST PLAN

> **CONTRACT NUMBER:** 1256 **TASK NUMBER:** 130

> **CONTROL NUMBER:** RE 1 00112

> **SAMPLE FAMILY:** DQ

> **SAMPLE EVENTS:** 001 thru 009

> **SITE:** X **PRE-PRODUCTION (243)** **CERP FOUNDRY (238)**

> **TEST TYPE:** Clay Ratio Study, using Tap Water Reference

> **MOLD TYPE:** Greensand, 20/80: Western/Southern Bentonite ratio with Seacoal and using Tap Water

> **NUMBER OF MOLDS:** 9

> **CORE TYPE**: Sodium Silicate Step Block Cores

> **TEST DATE:** **START:** 13 Dec 00

FINISH: 18 Dec 00

TEST OBJECTIVES:

Primary: To determine the effects on HAP emissions from a tap water tempered southern bentonite rich sodium silicate cored greensand mold containing Seacoal as the only known organic source and compare those emissions to test series DR (tap water, silicate core, 50/50 western/southern bentonite), DT (tap water, silicate core, 80/20 western/southern bentonite), DA (A/O water, silicate core, 20/80 western/southern bentonite), DS (A/O water, silicate core, 50/50 western/southern bentonite), and DU (A/O water, silicate core, 80/20 western/southern bentonite). This group of tests is a follow up on test DA made with virgin materials run as a single batch turns test. Series DQ will be monitored by the total hydrocarbon analyzer, sample tubes, bags, and condensate trap.

VARIABLES: Sand composition shall be maintained at 7.0 +/- 0.5 % MB clay, 5.0 +/- 0.3 % LOI using Hill & Griffith supplied clay and Seacoal. The Western Bentonite /Southern Bentonite ratio shall be 20/80. Sodium silicate step cores will be made using Wedron 420 Silica sand and 5.0 % J.B. DeVeene Kleencast #1 binder, gassed with CO_2 and dried at 250° F for two hours. The statistical validity of the test will be based on nine sampling events (molds).

BRIEF OVERVIEW: This test along with companion tests DR, DT, DA, DS, & DU is intended to determine how silicate cored green sand with 80/20, 50/50 & 20/80 western/southern bentonite ratios respond to both tap water and A/O water treatment. The bentonite content and LOI will initially be adjusted to 7.0% +/- 0.5% and 5.0% +/- 0.3% respectively. Subsequent molds will be made on a single mold "turns" basis with the bond replacement rate based on current sand lab data to maintain the clay & LOI contents within the above ranges. DQ molds will be made only after the process lab determinations or projections are complete.

SPECIAL CONDITIONS: Only tap water shall be used. The total hydrocarbon analyzer, tube samples, & condensate trap shall be used to gather and conduct emission tests on the sand to form the (9) mold test. Process effects on sand physical and mechanical properties shall be tracked**.**

Process Engineering Manager (Technikon)	12/15/00 Date
V.P. Measurement Technology (Technikon)	12-15-00 Date
V.P. Operations (Technikon)	12-15-00 Date
Emissions Team (USCAR)	2/22/01 Date
Process and Facilities Team (USCAR)	2/22/01 Date
Project Manager (CTC)	4/25/01 Date

Series DQ

Pre-production process instructions

A. Experiment: A study to compare the impact of tap water on molds with the Western/Southern Bentonite ratio of 1:4. The mold will be made from virgin green sand mold materials consisting of Seacoal; bentonite in the ratio of 1:4; tempered with tap water; poured at constant weight, surface area, sodium silicate core weight, and shape factor, a single batch turns test. This test is to be compared to reference tests DR, & DT, and comparative tests DA, DS, & DU.

1. Mold sand: Virgin mix of Wexford W450 lake sand, Okie 90 silica sand, western and southern Bentonites in ratio of 1:4, Seacoal, and tap water per recipe.

2. Core: Step core made with Wedron 420 silica sand and 5% J.B. DeVeene Kleencast #1® sodium silicate core binder, gassed with CO_2.

3. Metal: Class 30-35 gray cast iron poured at 2630°F.

Caution
Observe all safety precautions attendant to these operations as delineated in the Pre-production operating and safety instruction manual.

4. The following test shall be conducted:

a) Sand batch: Single sand batch to be used for all 9 DQ molds. All molds will be monitored in real time with the Airsense spectrometer and THC analyzer. Additionally sample tubes and condensables samples will be collected on each mold.

b) DQ001: Virgin mix as described above, vented mold, reference JB DeVeene Kleencast #1? cores, tap water.

c) DQ002-DQ009: The 20/80 western/southern bentonite comparative test; Re-mulled, reconstituted sand, tap water, vented mold, reference JB DeVeene Kleencast #1? cores.

B. Sodium silicate Core

1. Core sand mixing.

a) Clean the core sand mixer.

b) Add 50 pounds of Wedron 420 silica sand to the running mixer.

c) Slowly pour 2.5 +/- .03 pounds of Sodium silicate resin into the sand. Distribute the resin as it is poured. Avoid pouring the resin on the plows or walls of the mixer or in one location or resin balling will occur preventing proper mixing.

d) Mix for three minutes after the resin is all in.

e) One batch will make about 6 cores.

f) Once per hour catch a clean 50-100 gm sample of the raw sand for the sand lab to perform a core LOI test. Place the sample in a clean bag and label with date and time.

2. Making step cores.

a) Place the core box on a flat surface large open side up.

b) Place about 2 inches of sand in the bottom of the step section. Firmly tamp the sand into the 1inch diameter bottom using a ½ inch diameter rod.

c) Place a few more inches of sand in the core box and compact it. Take care to avoid parting planes. Repeat until the box is full.
d) Scrape off the excess. Remove the unused sand away from the gassing area.
e) Place a gassing plate on the open end of the core box.
f) Hold the plate down and gas the core for 20 seconds on each of the two gas holes with 20 psi CO2 gas.
g) Dry the cores for two hours at 250°F and allow to cool.
h) Bag the cores in moisture proof bags for storage.
i) Identify each bag by batch number.
j) Record the date, batch number, the batch mix time, sand batch weight, resin weight, the gassing time, the gas pressure, individual dried core weight, good core count from each batch.
k) The sand lab will determine the core LOI and the Resin Content LOI associated with each mold.

C. Sand preparation

1. Start up batch: make 1, DQ001.
a) Thoroughly clean the pre-production muller.
b) Weigh and add 1600 +/- 50 pounds total new Wexford W450 lake sand and Oklahoma 90 silica sand, per the recipe, to the running pre-production muller.
c) Add 5 pounds of tap water to the muller to suppress dust distributing it across the sand. Allow to mix for 1 minute.
d) Add the clays in proportion to the sand weight per the standardization mixture recipe for this test slowly to the muller to allow them to be distributed throughout the sand mass.
e) Dry mull for about 3 minutes to allow distribution and some grinding of the clays to occur.
f) Split the batch into approximately equal sized portions.
g) To each half-batch temper the sand-clay mixture slowly with tap water to allow for distribution.
h) After about 2 gallons of water have been added allow 30 seconds of mixing then start taking compactability test samples. Grab sufficient sample at each compactability test to fill a quart zip-lock bag. Label each bag and retain it.
i) Based on each test add water incrementally to adjust the temper. Allow 1 minute of mixing. Retest. Repeat until the compactability is in the range 45-51%.
j) Discharge the sand into the mold half.
k) Record the total sand mixed in the combined batch, the total of each type of clay added to the combined batch, the amount of water added to each half batch, the total mix time on each half batch, the final compactability and sand temperature at charge and discharge on each half batch, the time that the water was taken from its source, the time that each mold half was complete, the time the mold is delivered to the pour area, and the water type and temperature. Record the maximum muller current just prior to sand discharge.
l) The sand will be characterized for Methylene Blue Clay, Moisture content, Compactability, Green Compression strength, 1800°F loss on ignition (LOI), and

900°F volatiles. Each volatile and LOI test requires a separate 50-gram sample from the collected sand.

NOTE: The sand lab data must be available and approved by the process engineer before the mold is committed to pouring.

2. Re-mulling: make 8, DQ002-DQ009.
- **a)** Add all the sand from the previous mold to the muller including any sand previously mixed but not placed in the mold.
- **b)** Add 5 pounds of tap water to the muller to suppress dust distributing it across the sand. Allow to mix for 1 minute.
- **c)** Add the clays and coals per the re-bond recipe slowly to the muller to allow them to be distributed throughout the sand mass. Follow the above procedure beginning at C.1.e.
- **d)** The sand lab will sample the mold sand from each mold as it is being made and from the shaken out sand after it has been re-blended but before the additions are made. The three (3) "MOLD" samples will be taken from the initial muller discharge into the drag, from the last sand into the drag, and the last sand into the cope. The three (3) "SHAKEOUT" samples shall be taken from within the muller at three locations approximately 120 degrees apart. The sand will be tested for MB clay, compactability, and moisture content, green compression strength, 1800°F LOI, 900°F volatile. Each volatile and LOI test requires a separate 50-gram sample from the collected sand. Report results associated with the mold (test number, DQ0xx) from which it was taken.

NOTE: The sand lab data must be available from the blended shakeout sand and a recipe approved by the process engineer before the next mold is prepared. Additionally the sand lab data must be available and approved by the process engineer for the next mold's sand before the mold is committed to pouring.

NOTE: Once each day, at the time when the shakeout sand has been re-blended, the total sand shall be weighed and recorded. Extra sand shall be discarded to keep the batch weight at 1600 +/- 50 pounds.

D. Molding: Step block pattern.

1. Pattern preparation:
- **a)** Inspect and tighten all loose pattern and gating pieces.
- **b)** Repair any damaged pattern or gating parts.

2. Making the green sand mold.
- **a)** Lightly rub parting oil from a damp oil rag on the pattern particularly in the corners and recesses.

Caution: Do not pour gross amounts of parting oil on the pattern to be blown off with air. This practice will leave sufficient oil at the parting line to be adsorbed by the sand, weakening it, and the burning oil will be detected by the emission samplers.

b) Place 4 inches of loose sand on the pattern and ram all pockets and the perimeter tightly using only vertical strokes. Caution: non- vertical ramming strokes will move blocks of compacted sand leaving voids, which may cause the mold to fail. Do not ram all the sand to form a parting plane surface or the mold can fail. Add sand in increments of 4-6 inches of loose sand ramming tightly around the pattern.

c) When the rammed sand covers the pattern by 3 or more inches the sand can be rammed less tightly but still avoid lamination planes.

d) Level off the cope and drag mold surfaces opposite the pattern to minimize metal splatter and allow the mold to be fully supported.

e) Cut the pour basin smoothly to reduce the amount of sand prone to get washed down the sprue.

f) Remove the pattern, inspect and blow out the mold, and set the cores in the drag. Verify that the cores are fully set in their prints. The step cores will be flush with the parting line. If a piece of the mold is missing contact your supervision for a decision on the acceptability of the mold.

g) Vent the cope when required according to the test list above with ¼ vents according to the template.

h) Close the mold straight being careful not to crush anything.

i) Bolt the flask halves together and deliver the mold to the pouring area.

j) Weigh and record the closed unpoured mold, the core weigh, and the sand weight by difference.

E. Emission hood:

1. Loading.

a) Hoist the mold onto the shakeout deck within the emission hood.

b) Close, seal, and lock the emission hood

2. Shakeout.

a) After the cooling time prescribed in the emission test plan turn on the shakeout unit and run for the time prescribed in the emission test plan.

b) Turn off the shakeout, open the hood, remove the flask with casting, and recover the sand from the pit.

c) Weigh and record the metal poured.

d) Place the recovered sand in its entirety back into the brushed out muller and blend for three (3) minutes. Take three (3) samples from the re-blended shakeout sand. The three (3) "SHAKEOUT" samples shall be taken from within the muller at three locations 120 degrees apart. The sand will be tested for MB clay, compactability, and moisture content, green compression, 1800°F LOI, and 900°F volatile. Each volatile and LOI test requires a separate 50-gram sample from the collected sand. Report results associated with the mold (test number, DA0xx) from which it was taken.

F. Melting:

1. Initial charge:

a) Charge the furnace according to the heat recipe.

b) Place part of the steel scrap on the bottom, followed by carbon alloys, and the balance of the steel.

c) Place a pig on top on top.

d) Bring the furnace contents to the point of beginning to melt over a period of 1 hour at reduced power.
e) Add the balance of the metallic under full power until all is melted and the temperature has reached 2600 to 2700°F.
f) Slag the furnace and add the balance of the alloys.
g) Raise the temperature of the melt to 2700°F and take a DataCast 2000 sample. The temperature of the primary liquidus (TPL) must be in the range of 2200-2350°F.
h) Hold the furnace at 2500-2550°F until near ready to tap.
i) When ready to tap raise the temperature to 2700°F and slag the furnace.
j) Record all metallic and alloy additions to the furnace, tap temperature, and pour temperature. Record all furnace activities with an associated time.

2. Back charging.
a) Back charge the furnace according to the heat recipe,
b) Charge a few pieces of steel first to make a splash barrier, followed by the carbon alloys.
c) Follow the above steps beginning with F.1.e.

3. Emptying the furnace.
a) Pig the extra metal only after the last emission measurement is complete to avoid contaminating the air sample.
b) Cover the empty furnace with ceramic blanket to cool.

G. Pouring:

1. Preheat the ladle.
a) Tap 400 pounds more or less of 2700°F metal into the cold ladle.
b) Casually pour the metal back to the furnace.
c) Cover the ladle.
d) Reheat the metal to 2780 +/- 20°F.
e) Tap 450 pounds of iron into the ladle while pouring inoculating alloys onto the metal stream near its base.
f) Cover the ladle to conserve heat.
g) Move the ladle to the pour position, open the emission hood pour door and wait until the metal temperature reaches 2630 +/- 10°F.
h) Commence pouring keeping the sprue full.
i) Upon completion close the hood door, return the extra metal to the furnace, and cover the ladle.

Steven Knight
Mgr. Process Engineering
12/12/00

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/13/00											Samples to Clayton Lab.
EVENT 1											unless noted.
AIRSENSE	DQ00101										TOTAL
THC	DQ00102	X									TOTAL
NIOSH 1500 Mod.	DQ00103		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00104		1						200	2	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00105				1				0	2	QC-Manifold Blank
Excess									200	3	Excess
Excess									200	4	Excess
GAS, CO + CO2	DQ00106		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00107		1						500	6	Total
TO11	DQ00108				1				0	6	QC - Manifold Blank
Excess									500	7	Excess
NIOSH 2002	DQ00109		1						750	8	TOTAL (SKC 226-15)
NIOSH 2002	DQ00110				1				0	8	QC- Manifold Blank (SKC 226-15)
Excess									750	9	Excess
NIOSH 2011 Mod.	DQ00112		1						750	10	TOTAL (Orbo 53)
NIOSH 2011 Mod.	DQ00113				1				0	10	QC - Manifold Blanks (Orbo 53)
Excess									750	11	Excess
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00114		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/13/00											Samples to Clayton Lab.
EVENT 2											unless noted.
AIRSENSE	DQ00201										TOTAL
THC	DQ00202	X									TOTAL
NIOSH 1500 Mod.	DQ00203		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00204		1						200	2	TOTAL (Orbo 32 SM)
Excess									200	3	Excess
Excess									200	4	Excess
GAS,CO + CO2	DQ00205		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00206		1						500	6	TOTAL
TO11	DQ00207					1			500	6	TOTAL
Excess									500	7	Excess
NIOSH 2002	DQ00208		1						750	8	TOTAL (SKC 226-15)
Excess									750	9	Excess
NIOSH 2011 Mod.	DQ00209		1						750	10	TOTAL (Orbo 53)
Excess									750	11	Excess
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00210		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/13/00											Samples to Clayton Lab.
EVENT 3											unless noted.
AIRSENSE	DQ00301										TOTAL
THC	DQ00302	X									TOTAL
NIOSH 1500 Mod.	DQ00303		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00304			1					200	2	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00305		1						200	3	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00306			1					200	4	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00307				1						QC - (Orbo 32 SM)
GAS,CO + CO2	DQ00308		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00309		1						500	6	TOTAL
TO11	DQ00310			1					500	7	TOTAL
TO11	DQ00311				1						QC
NIOSH 2002	DQ00312		1						750	8	TOTAL (SKC 226-15)
NIOSH 2002	DQ00313			1					750	9	TOTAL (SKC 226-15)
NIOSH 2002	DQ00314				1						QC - (SKC 226-15)
NIOSH 2011 Mod.	DQ00315		1						750	10	TOTAL (Orbo 53)
NIOSH 2011 Mod.	DQ00316			1					750	11	TOTAL (Orbo 53)
NIOSH 2011 Mod.	DQ00317				1						QC - (Orbo 53)
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00318		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/14/00											Samples to Clayton Lab.
EVENT 4											unless noted.
AIRSENSE	DQ00401										TOTAL
THC	DQ00402	X									TOTAL
NIOSH 1500 Mod.	DQ00403		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00404		1						200	2	TOTAL (Orbo 32 SM)
Excess									200	3	Excess
Excess									200	4	Excess
GAS,CO + CO2	DQ00405		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00406		1						500	6	TOTAL
Excess									500	7	Excess
NIOSH 2002	DQ00407		1						750	8	TOTAL (SKC 226-15)
Excess									750	9	Excess
NIOSH 2011 Mod.	DQ00408		1						750	10	TOTAL (Orbo 53)
Excess									750	11	Excess
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00409		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/14/00											Samples to Clayton Lab.
EVENT 5											unless noted.
AIRSENSE	DQ00501										TOTAL
THC	DQ00502	X									TOTAL
NIOSH 1500 Mod.	DQ00503		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00504		1						200	2	TOTAL (Orbo 32 SM)
Excess									200	3	Excess
Excess									200	4	Excess
GAS,CO + CO2	DQ00505		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00506		1						500	6	TOTAL
Excess									500	7	Excess
NIOSH 2002	DQ00507		1						750	8	TOTAL (SKC 226-15)
Excess									750	9	Excess
NIOSH 2011 Mod.	DQ00508		1						750	10	TOTAL (Orbo 53)
Excess									750	11	Excess
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00509		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/14/00											Samples to Clayton Lab.
EVENT 6											unless noted.
AIRSENSE	DQ00601										TOTAL
THC	DQ00602	X									TOTAL
NIOSH 1500 Mod.	DQ00603		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00604		1						200	2	TOTAL (Orbo 32 SM)
Excess									200	3	Excess
Excess									200	4	Excess
GAS,CO + CO2	DQ00605		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00606		1						500	6	TOTAL
Excess									500	7	Excess
NIOSH 2002	DQ00607		1						750	8	TOTAL (SKC 226-15)
Excess									750	9	Excess
NIOSH 2011 Mod.	DQ00608		1						750	10	TOTAL (Orbo 53)
Excess									750	11	Excess
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00609		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/18/00											Samples to Clayton Lab.
EVENT 7											unless noted.
AIRSENSE	DQ00701										TOTAL
THC	DQ00702	X									TOTAL
NIOSH 1500 Mod.	DQ00703		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00704			1					200	2	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00705		1						200	3	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00706			1					200	4	TOTAL (Orbo 32 SM)
GAS,CO + CO2	DQ00707		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00708		1						500	6	TOTAL
TO11	DQ00709			1					500	7	TOTAL
NIOSH 2002	DQ00710		1						750	8	TOTAL (SKC 226-15)
NIOSH 2002	DQ00711			1					750	9	TOTAL (SKC 226-15)
NIOSH 2011 Mod.	DQ00712		1						750	10	TOTAL (Orbo 53)
NIOSH 2011 Mod.	DQ00713			1					750	11	TOTAL (Orbo 53)
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00714		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/18/00											Samples to Clayton Lab.
EVENT 8											unless noted.
AIRSENSE	DQ00801										TOTAL
THC	DQ00802	X									TOTAL
NIOSH 1500 Mod.	DQ00803		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00804		1						200	2	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00805				1						QC -Blank (Orbo 32 SM)
Excess									200	3	Excess
Excess									200	4	Excess
GAS,CO + CO2	DQ00806		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00807		1						500	6	TOTAL
TO11	DQ00808				1						QC - Blank
Excess									500	7	Excess
NIOSH 2002	DQ00809		1						750	8	TOTAL (SKC 226-15)
NIOSH 2002	DQ00810				1						QC -Blank(SKC 226-15)
Excess									750	9	Excess
NIOSH 2011 Mod.	DQ00811		1						750	10	TOTAL (Orbo 53)
NIOSH 2011 Mod.	DQ00812				1						QC - Blank (Orbo 53)
Excess									750	11	Excess
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00813		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/18/00											Samples to Clayton Lab.
EVENT 9											unless noted.
AIRSENSE	DQ00901										TOTAL
THC	DQ00902	X									TOTAL
NIOSH 1500 Mod.	DQ00903		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00904		1						200	2	TOTAL (Orbo 32 SM)
Excess									200	3	Excess
Excess									200	4	Excess
GAS,CO + CO2	DQ00905		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00906		1						500	6	TOTAL
Excess									500	7	Excess
NIOSH 2002	DQ00907		1						750	8	TOTAL (SKC 226-15)
Excess									750	9	Excess
NIOSH 2011 Mod.	DQ00908		1						750	10	TOTAL (Orbo 53)
Excess									750	11	Excess
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00909		1						15L		Sample using opposite port

NIOSH 1500 Mod.	DQ00910						X		200		BOTTLE - Mix 1A (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00911						X		200		BOTTLE - Mix 1A (Orbo 32 SM)

APPENDIX B TEST SERIES DQ - DETAILED RESULTS

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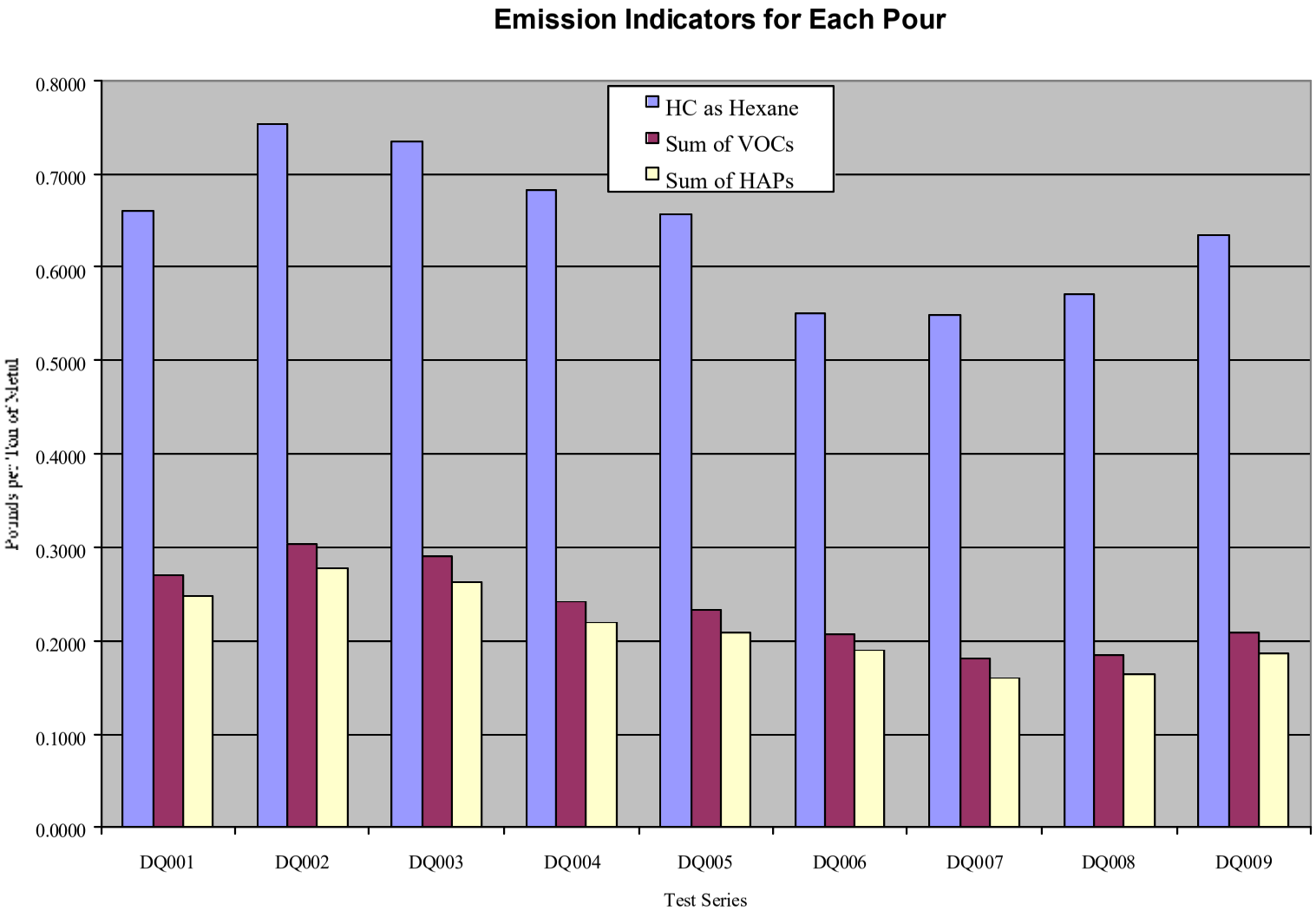
Emission Indicators for Each Pour
HC as Hexane
Sum of VOCs
Sum of HAPs
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0.4000
0.3000
0.2000
0.1000
0.0000
Pounds per Ton of Metal
DQ001
DQ002
DQ003
DQ004
DQ005
DQ006
DQ007
DQ008
DQ009
Test Series

Test Plan DQ Individual Test Results – Lbs/ton of Metal - Nine Runs

POMs	HAPS	COMPOUND / SAMPLE NUMBER	DQ001	DQ002	DQ003	DQ004	DQ005	DQ006	DQ007	DQ008	DQ009	AVERAGE	STDEV
		Pour Date	12/13/00	12/13/00	12/13/00	12/14/00	12/14/00	12/14/00	12/18/00	12/18/00	12/18/00		
		THC as Propane	3.22E+00	3.21E+00	2.88E+00	2.55E+00	2.30E+00	2.12E+00	1.95E+00	1.83E+00	2.07E+00	2.46E+00	5.34E-01
		HC as Hexane	6.61E-01	7.53E-01	7.35E-01	6.82E-01	6.56E-01	5.50E-01	5.50E-01	5.71E-01	6.34E-01	6.44E-01	7.50E-02
		Sum of VOCs	2.70E-01	3.04E-01	2.90E-01	2.42E-01	2.33E-01	2.08E-01	1.81E-01	1.84E-01	2.08E-01	2.36E-01	4.48E-02
		Sum of HAPs	2.47E-01	2.77E-01	2.62E-01	2.19E-01	2.09E-01	1.89E-01	1.61E-01	1.64E-01	1.86E-01	2.13E-01	4.19E-02
		Sum of POMs	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	N/A
		Individual HAPs and VOCs											
	z	Benzene	1.38E-01	1.43E-01	1.30E-01	1.09E-01	9.81E-02	9.52E-02	7.45E-02	7.38E-02	8.40E-02	1.05E-01	2.66E-02
	z	Toluene	5.56E-02	6.79E-02	6.70E-02	5.56E-02	5.61E-02	4.91E-02	4.42E-02	4.59E-02	5.08E-02	5.47E-02	8.40E-03
	z	Xylene (Total)	3.92E-02	5.04E-02	5.03E-02	4.13E-02	4.19E-02	3.52E-02	3.25E-02	3.43E-02	3.75E-02	4.03E-02	6.51E-03
		Octane	1.46E-02	1.59E-02	1.38E-02	1.20E-02	1.08E-02	8.71E-03	9.64E-03	9.07E-03	1.03E-02	1.17E-02	2.58E-03
		1,2,4-Trimethylbenzene	8.53E-03	1.16E-02	1.44E-02	1.07E-02	1.33E-02	9.93E-03	1.04E-02	1.10E-02	1.15E-02	1.13E-02	1.74E-03
	z	Ethylbenzene	7.09E-03	8.87E-03	8.71E-03	7.00E-03	7.17E-03	5.72E-03	5.07E-03	5.44E-03	6.08E-03	6.80E-03	1.36E-03
	z	Acetaldehyde	7.34E-03	6.69E-03	5.64E-03	5.93E-03	5.22E-03	4.10E-03	4.88E-03	5.00E-03	7.90E-03	5.85E-03	1.24E-03
x	z	1-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	N/A
x	z	2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	N/A
x	z	Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	N/A
	z	Aniline	I	I	I	I	I	I	I	I	I	N/A	N/A
	z	Phenol	I	I	I	I	I	I	I	I	I	N/A	N/A
		Other Analytes											
		Carbon Monoxide	5.40E+00	5.08E+00	NT	NT	NT	NT	NT	NT	NT	5.24E+00	2.30E-01
		Methane	1.56E+00	1.43E+00	NT	NT	NT	NT	NT	NT	NT	1.50E+00	9.14E-02
		Carbon Dioxide	3.00E+01	1.75E+01	NT	NT	NT	NT	NT	NT	NT	2.37E+01	8.85E+00
		Ethane	ND	ND	NT	NT	NT	NT	NT	NT	NT	N/A	N/A
		Propane	ND	ND	NT	NT	NT	NT	NT	NT	NT	N/A	N/A
		Isobutene	ND	ND	NT	NT	NT	NT	NT	NT	NT	N/A	N/A
		Butane	ND	ND	NT	NT	NT	NT	NT	NT	NT	N/A	N/A
		Neopentane	ND	ND	NT	NT	NT	NT	NT	NT	NT	N/A	N/A
		Isopentane	ND	ND	NT	NT	NT	NT	NT	NT	NT	N/A	N/A

Test Plan DQ Individual Test Results (continued)

POMs	HAPS	COMPOUND / SAMPLE NUMBER	DQ001	DQ002	DQ003	DQ004	DQ005	DQ006	DQ007	DQ008	DQ009	AVERAGE	STDEV
		Pentane	ND	ND	NT	NT	NT	NT	NT	NT	NT	N/A	N/A
		Condensables	3.16E-01	NA	2.55E-01	2.89E-01	2.39E-01	1.35E-01	2.04E-01	2.18E-01	2.03E-01	2.32E-01	5.63E-02

I: Data was rejected based on data validation considerations.
All "Other Analytes" are not included in the sum of HAPs or VOCs.
N/A: Not Applicable; NT: Not Tested

Test Plan DQ Individual Test Results – Lbs/ton of Metal – Six Runs

POMs	HAPS	COMPOUND / SAMPLE NUMBER	DQ004	DQ005	DQ006	DQ007	DQ008	DQ009	AVERAGE	STDEV
		Pour Date	12/14/00	12/14/00	12/14/00	12/18/00	12/18/00	12/18/00		
		THC as Propane	2.55E+00	2.30E+00	2.12E+00	1.95E+00	1.83E+00	2.07E+00	2.14E+00	2.56E-01
		HC as Hexane	6.82E-01	6.56E-01	5.50E-01	5.50E-01	5.71E-01	6.34E-01	6.07E-01	5.76E-02
		Sum of VOCs	2.42E-01	2.33E-01	2.08E-01	1.81E-01	1.84E-01	2.08E-01	2.09E-01	2.46E-02
		Sum of HAPs	2.19E-01	2.09E-01	1.89E-01	1.61E-01	1.64E-01	1.86E-01	1.88E-01	2.32E-02
		Sum of POMs	ND	ND	ND	ND	ND	ND	N/A	N/A
			Individual HAPs and VOCs							
	z	Benzene	1.09E-01	9.81E-02	9.52E-02	7.45E-02	7.38E-02	8.40E-02	8.91E-02	1.42E-02
	z	Ethylbenzene	7.00E-03	7.17E-03	5.72E-03	5.07E-03	5.44E-03	6.08E-03	6.08E-03	8.48E-04
	z	Toluene	5.56E-02	5.61E-02	4.91E-02	4.42E-02	4.59E-02	5.08E-02	5.03E-02	4.89E-03
	z	Xylene (Total)	4.13E-02	4.19E-02	3.52E-02	3.25E-02	3.43E-02	3.75E-02	3.71E-02	3.86E-03
		1,2,4-Trimethylbenzene	1.07E-02	1.33E-02	9.93E-03	1.04E-02	1.10E-02	1.15E-02	1.11E-02	1.17E-03
		Octane	1.20E-02	1.08E-02	8.71E-03	9.64E-03	9.07E-03	1.03E-02	1.01E-02	1.23E-03
	z	Acetaldehyde	5.93E-03	5.22E-03	4.10E-03	4.88E-03	5.00E-03	7.90E-03	5.50E-03	1.31E-03
x	z	1-Methylnaphthalene	ND	ND	ND	ND	ND	ND	N/A	N/A
x	z	2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	N/A	N/A
x	z	Naphthalene	ND	ND	ND	ND	ND	ND	N/A	N/A
	z	Aniline	I	I	I	I	I	I	N/A	N/A
	z	Phenol	I	I	I	I	I	I	N/A	N/A
			Other Analytes							
		Condensables	2.89E-01	2.39E-01	1.35E-01	2.04E-01	2.18E-01	2.03E-01	2.15E-01	5.06E-02
			DQ001	**DQ002**	**AVERAGE**	**STDEV**				
		Pour Date	**12/13/00**	**12/13/00**						
		Carbon Monoxide	5.40E+00	5.08E+00	5.24E+00	2.30E-01				
		Methane	1.56E+00	1.43E+00	1.50E+00	9.14E-02				
		Carbon Dioxide	3.00E+01	1.75E+01	2.37E+01	8.85E+00				
		Ethane	ND	ND	N/A	N/A				
		Propane	ND	ND	N/A	N/A				
		Isobutene	ND	ND	N/A	N/A				
		Butane	ND	ND	N/A	N/A				
		Neopentane	ND	ND	N/A	N/A				
		Isopentane	ND	ND	N/A	N/A				
		Pentane	ND	ND	N/A	N/A				

I: Data was rejected based on data validation considerations.
All "Other Analytes" are not included in the sum of HAPs or VOCs.
N/A: Not Applicable; NT: Not Tested

APPENDIX C TEST SERIES DQ - DETAILED PROCESS AND SOURCE DATA

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Test Series DQ – Detailed Process and Source Data

Description	DQ001	DQ002	DQ003	DQ004	DQ005	DQ006	DQ007	DQ008	DQ009	Averages
	12/13/00	12/13/00	12/13/00	12/14/00	12/14/00	12/14/00	12/18/00	12/18/00	12/18/00	
Casting Metal Weight, lbs.	234	234	247	240	263	318	246	247	245	252
Total Mold Weight, lbs.	1362	1375	1362	1356	1363	1316	1351	1325	1322	1348
Total Core Weight, lbs.	59.60	59.55	60.35	59.26	59.06	58.97	60.55	60.11	59.94	59.71
Compactability, %	50	48	39	47	40	37	39	44	38	42
Total Binder Weight, lbs	2.84	2.83	2.87	2.82	2.81	2.81	2.88	2.86	2.85	2.84
No. Cavities Poured	8	8	8	8	8	8	8	8	8	8
LOI, % (at mold) 1800°F	5.88	5.20	4.89	4.95	4.85	4.82	4.57	4.59	4.99	4.97
LOI, % (at shakeout) 1800°F	5.26	5.25	4.55	4.81	4.63	4.53	4.17	4.00	4.56	4.64
Clays, % (at mold)	6.07	6.33	6.46	6.33	5.81	6.46	6.85	6.72	6.85	6.43
Clays, % (at shakeout)	5.68	5.17	5.17	4.65	5.30	5.56	5.43	5.68	5.56	5.36
LOI, % (Cores) 1400°F	0.59	0.67	0.60	0.64	0.57	0.63	0.60	0.61	0.64	0.62
Volatiles, % (at mold) avg. 900°F	1.26	1.00	1.02	1.06	1.04	0.92	0.82	0.74	0.88	0.97
Volatiles, % (at shakeout) avg. 900°F	1.16	1.04	0.94	1.06	0.90	0.78	0.82	0.72	0.70	0.90
Pouring Temperature, °F	2629	2633	2638	2640	2640	2623	2639	2629	2639	2634
Mold Strength, psi	10.92	11.11	11.73	12.75	13.58	14.75	15.01	17.32	16.98	13.79
Core Binder Content, %	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76
Water Type used in Mold	Tap	Tap	Tap	Tap	Tap	Tap	Tap	Tap	Tap	N/A
Total Clays - added, lbs/mold	92.48	5.22	5.22	10.00	5.22	15.00	11.50	10.20	11.52	18.48
Seacoal - added, lbs/mold	87.04	0.00	0.00	1.00	2.00	2.00	3.00	3.00	12.00	12.23
Lignite - added, lbs/mold	-	-	-	-	-	-	-	-	-	-
Soda Ash - added, gms/mold	-	-	-	-	-	-	-	-	-	-
Mold Sand Acidity, pH	-	-	-	-	-	-	-	-	-	-
Average Stack Temperature, °F	104	104	111	104	109	118	104	107	111	108
Total Moisture Content, %	1.45	1.50	1.52	1.67	1.72	1.91	1.24	1.50	1.61	1.57

Test Series DQ – Detailed Process and Source Data

Description	DQ001	DQ002	DQ003	DQ004	DQ005	DQ006	DQ007	DQ008	DQ009	Averages
	12/13/00	12/13/00	12/13/00	12/14/00	12/14/00	12/14/00	12/18/00	12/18/00	12/18/00	
Average Stack Velocity, ft./sec.	15.9	15.9	16.0	15.8	15.9	16.0	15.8	15.8	15.9	15.89
Avg. Stack Pressure, in. Hg	30.09	30.03	30.03	30.18	30.24	30.24	30.40	30.38	30.34	30.21
Stack Flow Rate, scfm	694	693	688	694	691	684	699	695	691	692

Binder fraction = (binder (lbs)/(sand + binder (lbs)) Binder fraction x core weight used in mold = Total Binder Weight Example: (5.0 /(100 + 5.0)) = 0.0476 x 59.60 = 2.894 (lbs binder per mold).

NOTE:1 DQ006 has a high casting metal weight because of a larger than normal pour basin. Retain this test. THC data indicates the impact is less than 5% on the results and statistically, the confidence level in the conclusion is less without this test than with it.

APPENDIX D METHOD 25A CHARTS

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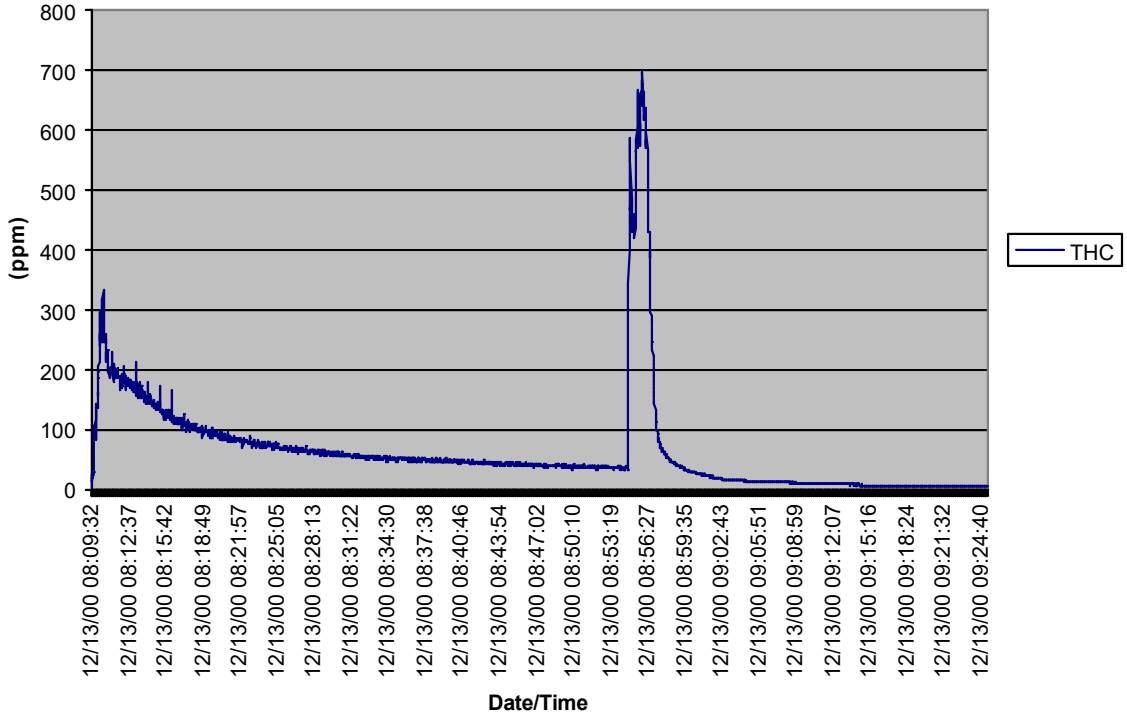
DQ001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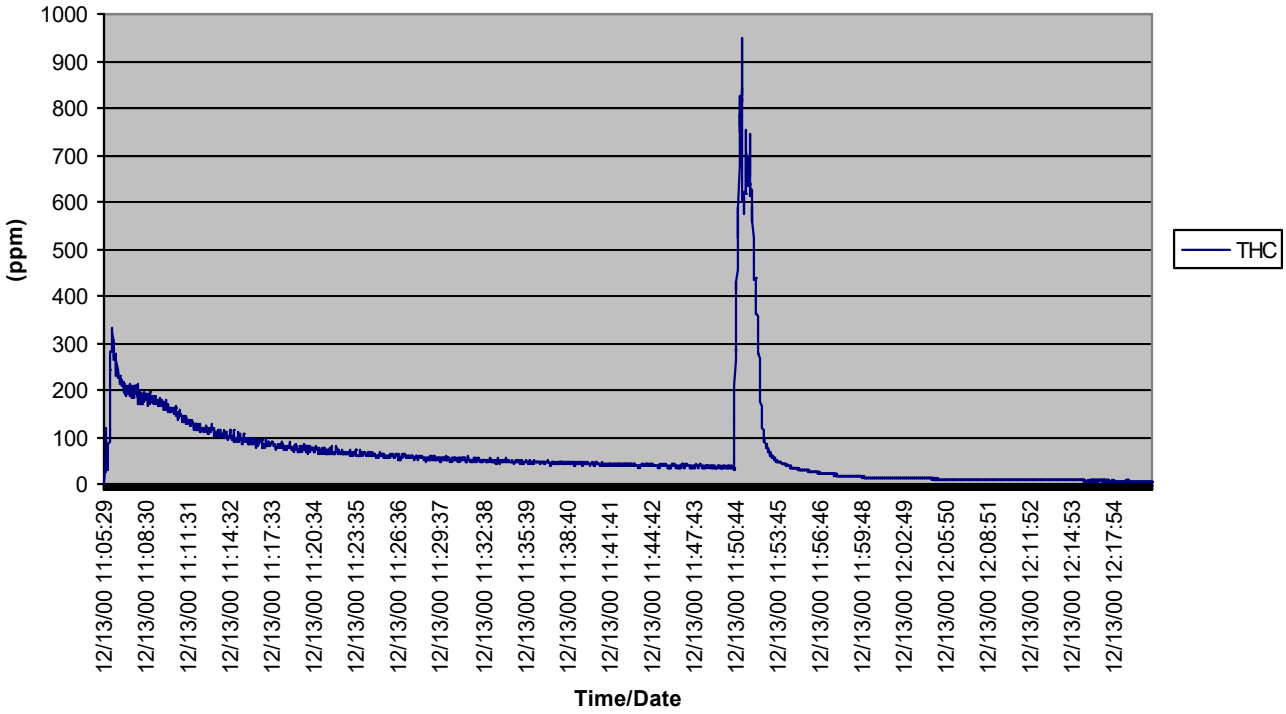
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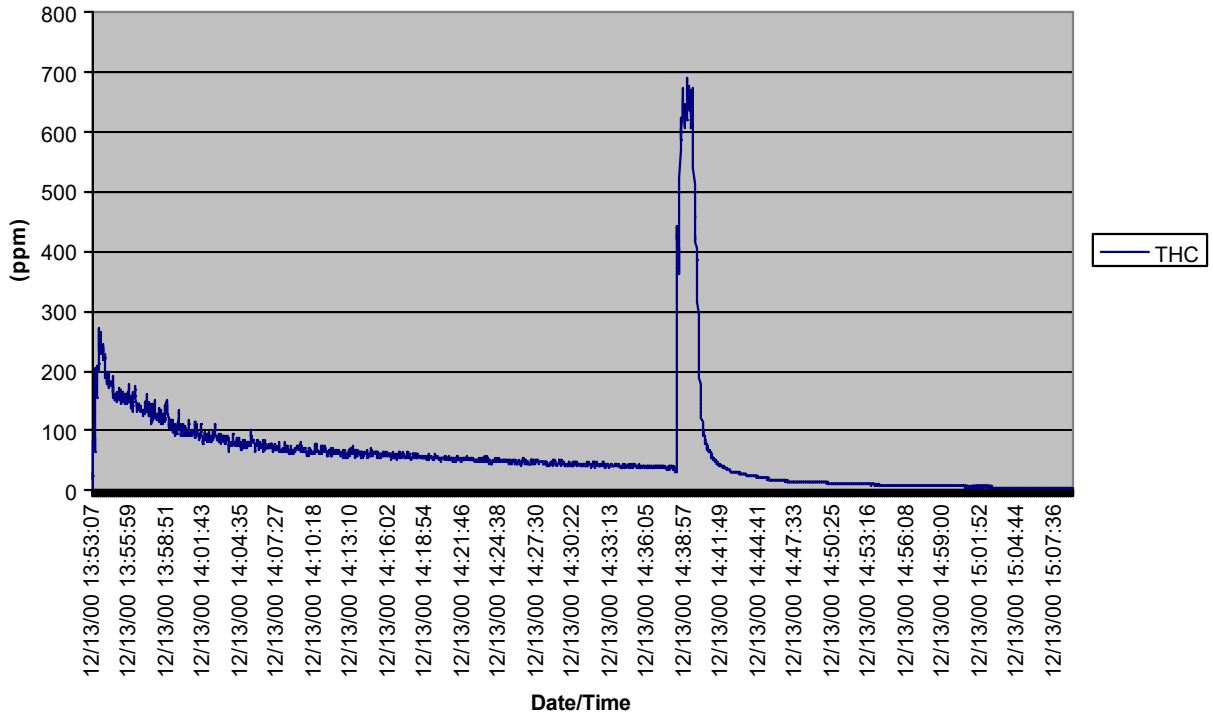
DQ003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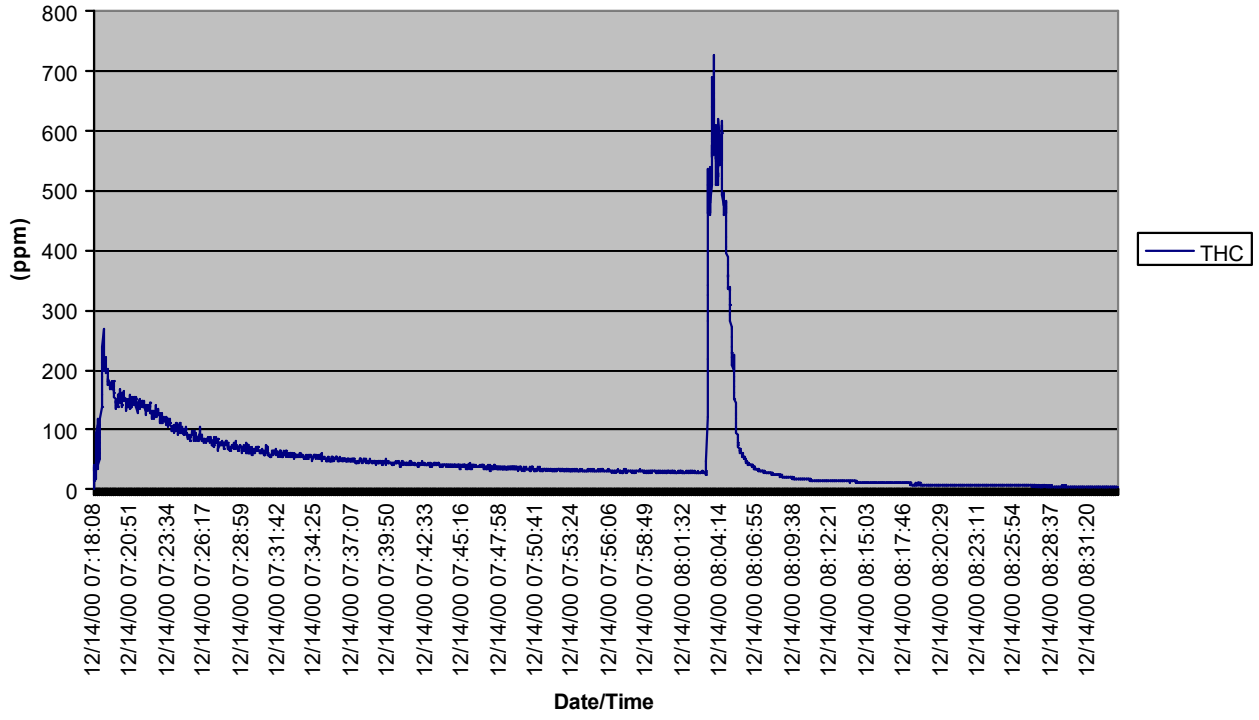
Date/Time

DQ004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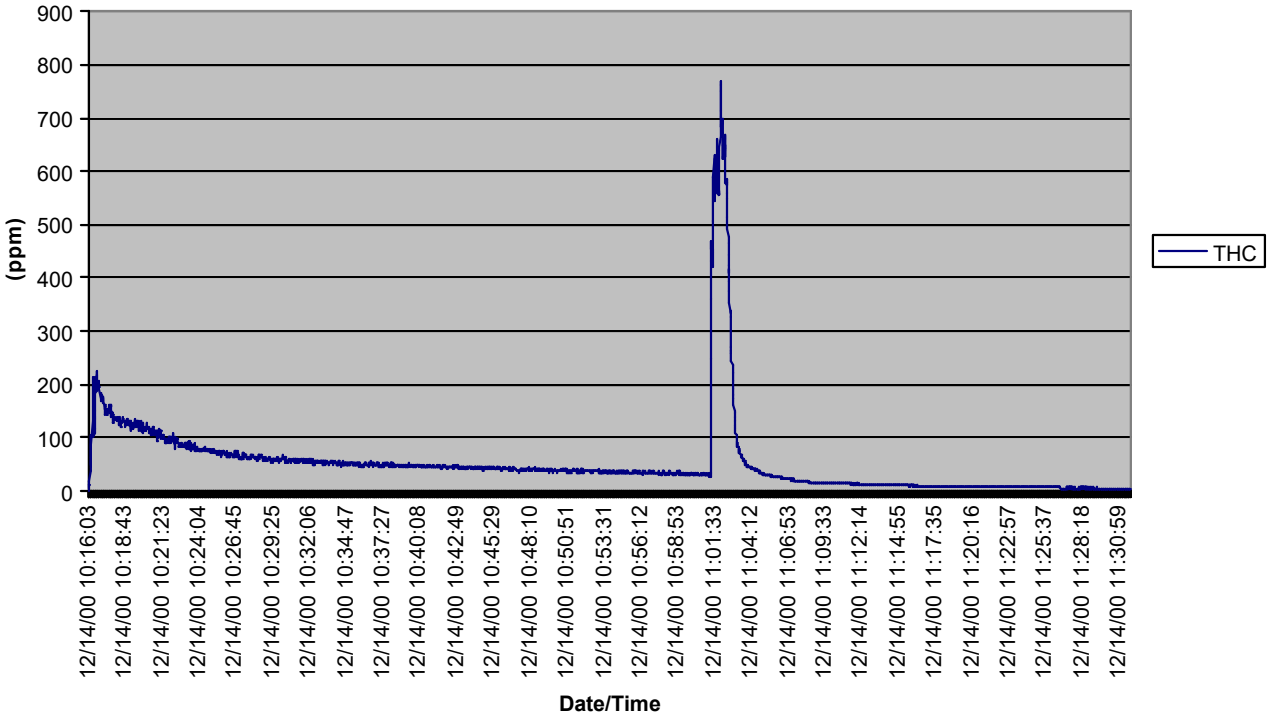
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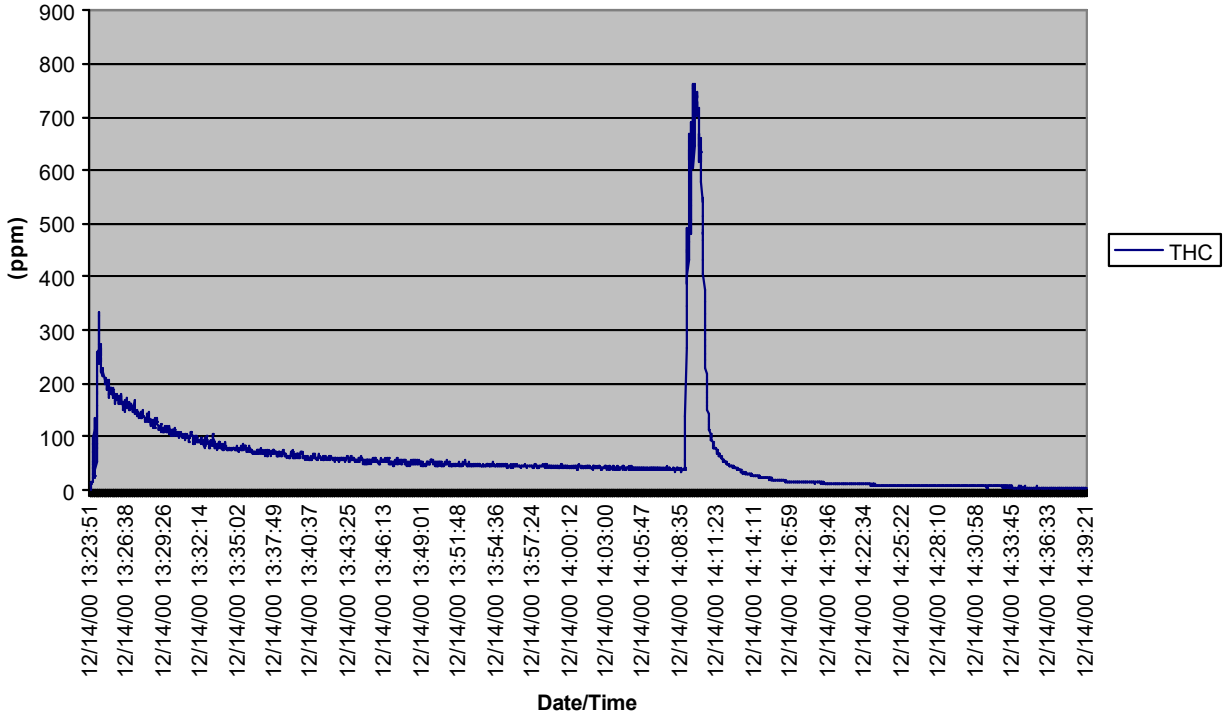
Date/Time

DQ006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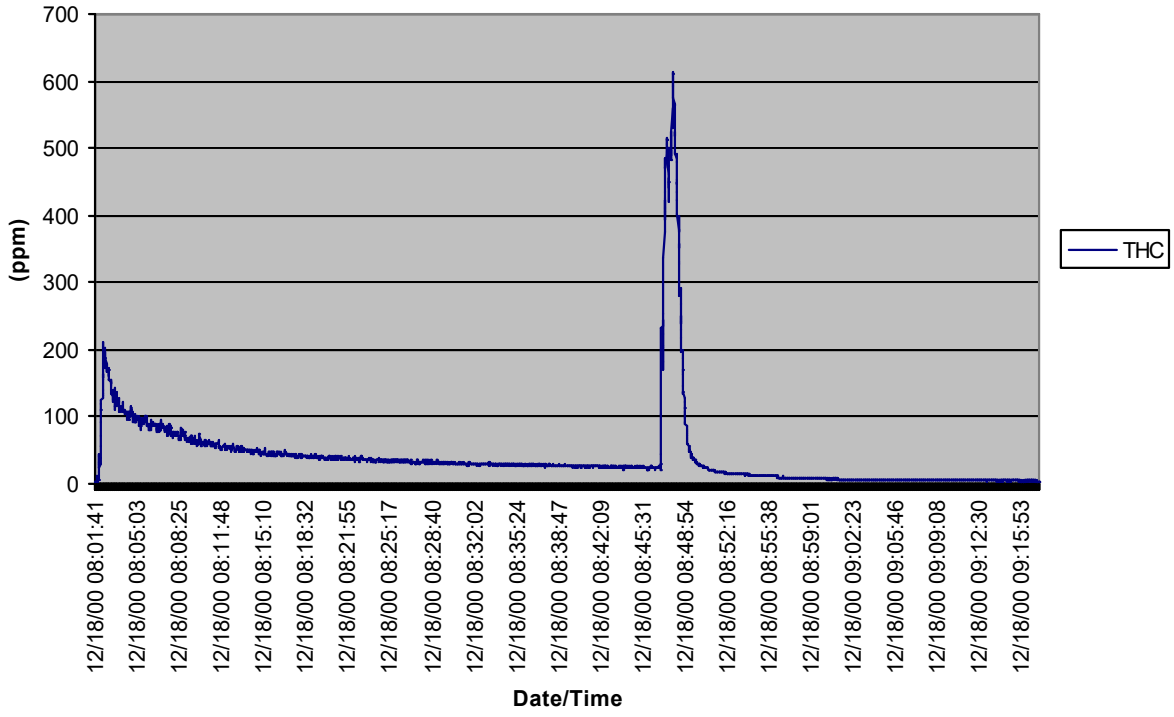
Date/Time

DQ007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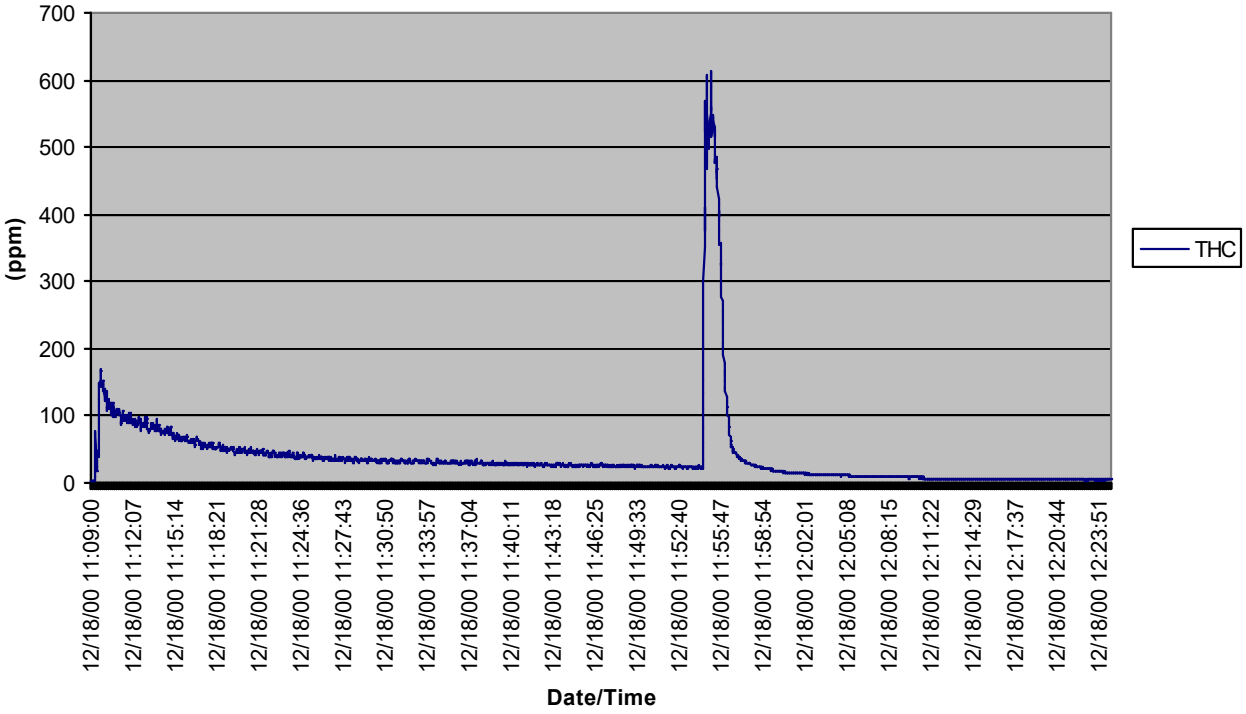
Date/Time

DQ008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THC
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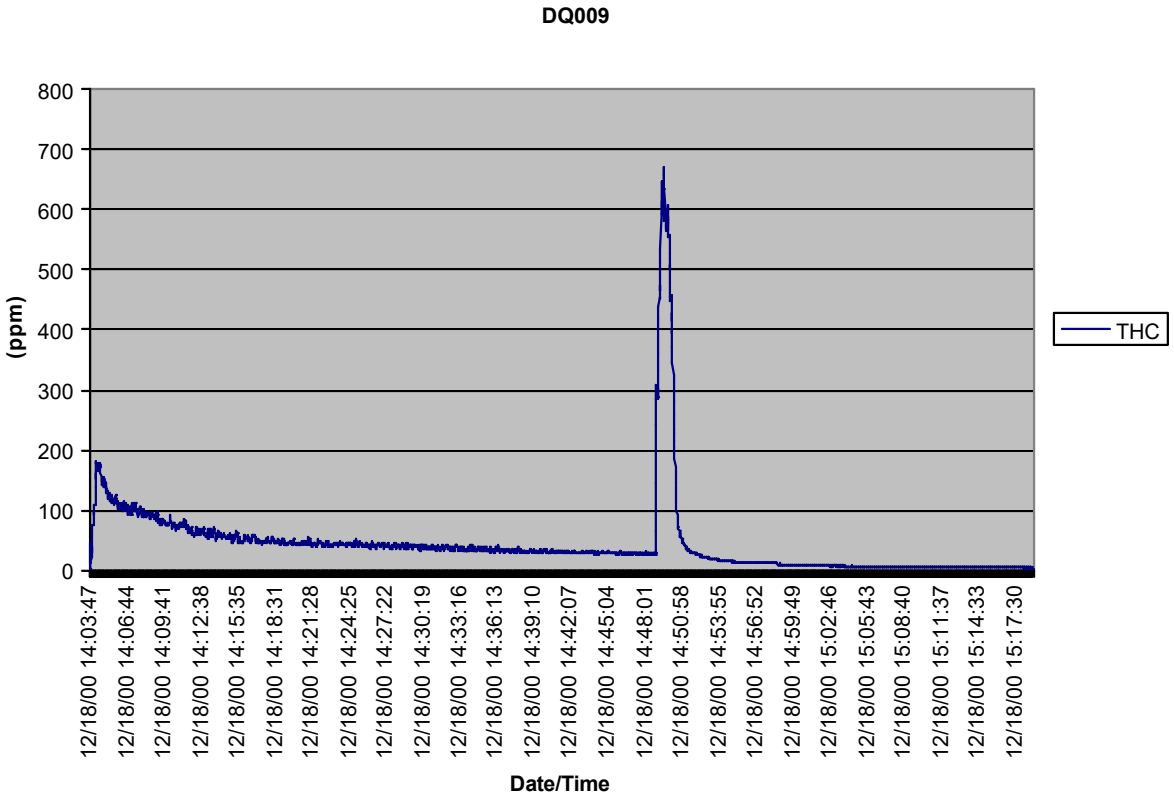
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12/18/00 15:11:37
12/18/00 15:14:33
12/18/00 15:17:30
Date/Time
THC

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APPENDIX E LISTING OF SUPPORT DOCUMENTS

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The following documents contain specific test results, procedures, and documentation used in support of this Test Plan

1. Casting Emission Reduction Program – Foundry Product Testing Guide: Reducing Emissions by Comparative Testing, May 4, 1998.

2. Emissions Testing and Analytical Testing Standard Operating Procedures.

3. Emission Baseline Test Results for the CERP Pre-production Foundry Processes.

4. Evaluation of the Required Number of Replicate Tests to Provide Statistically Significant Air Emission Reduction Comparisons for the CERP Pre-production Foundry Test Program.

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APPENDIX F GLOSSARY

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t-Test	The calculated T statistic, Ts, is compared against a table value. The table value is a function of the sample size and on the level of confidence desired. For tests with nine sample values each, the T value associated with a confidence level of 95% is 2.12. Calculated values of Ts greater than or equal to this value would indicate that there is 95% or better probability that the differences between the two test series were not the result of test variability.
LOI	Loss On Ignition - the total weight change resulting from combustion in air at 1400^{o}F or 1800^{o}F.
ND	Non Detect, No Data
No Test	Lab testing was not done on this analyte.
HC as Undecane	Calculated by the summation of all area before elution of Hexane to after the elution of Anthracene. The quantity of THC is performed against a five-point calibration curve of Undecane by dividing the total area count from C6 to C14 to the area of Undecane curve from the initial calibration curve.

Craig Schmeisser

From: Hartman, Matthew <MATTHEW.HARTMAN@ask-chemicals.com>
Sent: Tuesday, July 27, 2021 8:54 AM
To: Craig Schmeisser
Subject: RE: PCS Emissions from FWNA Initial Installation

Craig

I have a little bit more info on a different product but similar. Do you have any CERP reports to compare. I only have one that just lists results by a single product in different technologies as opposed to several options per technology.

Compound of Interest	Pouring and Cooling (mg/g of binder)	Shakeout (mg/g of binder)	Total (mg/g of binder)
Total VOC	84.8	20.5	105.3
Carbon Monoxide (CO)	40.0	10.3	50.3
Benzene	4.14	0.08	4.22
Toluene	0.59	not detected	0.59
Ethyl Benzene	0.03	not detected	0.03
Xylenes	0.17	not detected	0.17
Naphthalene	0.89	0.23	1.12
Phenol	6.47	2.97	9.44
Propylene Carbonate	not detected	not detected	not detected
Dimethyl Succinate	5.23	1.12	6.35
Dimethyl Glutarate	12.71	3.00	15.71
Dimethyl Adipate	2.46	0.48	2.94
2-Methyl Naphthalene	not detected	not detected	not detected
1-Methyl Naphthalene	not detected	not detected	not detected
Rapeseed Methyl Ester	0.29	not detected	0.29

Table 2: Hoodstack emissions data for pouring, cooling, and shakeout for ISOCURE 106/206

Thanks

Matthew Hartman
Foundry Resins Business Line Manager

ASK Chemicals LP
495 Metro Place South
Dublin Ohio, 43017
Phone 614-763-0240
Mobile 614-404-2818
Matthew.Hartman@ask-chemicals.com

ASKCHEMICALS
We advance your casting

Matthew Hartman

Business Line Manager
Cold Box Busniss Line Manager - Americas

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43017 Dublin, Ohio, United States
Phone: +1 614 763-0240
Mobile: +1 614 4042818
E-Mail: MATTHEW.HARTMAN@ask-chemicals.com

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From: Craig Schmeisser <craig.schmeisser@madriverstrategies.com>
Sent: Monday, July 26, 2021 1:22 PM
To: Hartman, Matthew <MATTHEW.HARTMAN@ask-chemicals.com>
Subject: FW: PCS Emissions from FWNA Initial Installation

Hi Matthew,
I haven't see a response to the below. Can you provide any feedback? Thanks.

From: Craig Schmeisser
Sent: Monday, July 12, 2021 9:24 PM
To: Hartman, Matthew <MATTHEW.HARTMAN@ask-chemicals.com>
Subject: RE: PCS Emissions from FWNA Initial Installation

Hi Matthew,
Thanks for the VOC and CO information. In addition to VOC/CO (and other criteria pollutants), we need to estimate the emissions of hazardous air pollutants (HAPs) and Ky regulates other toxic air contaminants (TACs) via an obscure rule. Do you have any organic HAP information? If not, any idea which CERP report may more closely align with the emissions from 109/209? Regards.

From: Hartman, Matthew <MATTHEW.HARTMAN@ask-chemicals.com>
Sent: Monday, July 12, 2021 3:53 PM
To: Craig Schmeisser <craig.schmeisser@madriverstrategies.com>
Subject: RE: PCS Emissions from FWNA Initial Installation

Craig

For Isocure Focus 109/209 that is used at Fritz Winter we have VOC (mg/g binder) and CO (mg/g binder) for pour and shakeout. OCMA VOC data is below also for them. Sand and resin are from their process.

Isocure Focus 109/209

	Total Voc	CO
Pouring	9.9	8.5
Shakeout	1.9	2.1
Total	11.8	10.6

	Mix 1
Sand	Fritz Winter Gelsar 50
Sand Additive %	-
Sand Additive	-
Lot #	-
Resin % & Ratio	109/209 @ 1.2% & 50/50
Resin Part 1	Isocure 109
Lot #	Lab Made
Resin Part 2	Isocure 209
Lot #	Lab Made
Total Resin	36

109/209	
24 HR Wt. Loss (g.) due to Volatiles	1.01
24 HR Pound Volatile loss/Ton Sand	0.67
24 HR Pound Volatile loss/Pound Binder	0.0281

Matthew Hartman
Foundry Resins Business Line Manager

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Mobile 614-404-2818
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ASKCHEMICALS
We advance your casting

Matthew Hartman
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Phone: +1 614 763-0240
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E-Mail: MATTHEW.HARTMAN@ask-chemicals.com

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Please consider the environment before printing this e-mail!

From: Craig Schmeisser <craig.schmeisser@madriverstrategies.com>
Sent: Monday, July 12, 2021 11:15 AM
To: Hartman, Matthew <MATTHEW.HARTMAN@ask-chemicals.com>
Subject: PCS Emissions from FWNA Initial Installation

Good morning Matthew,
See page 19, Runs 020-022 of the Rheotec XL+ binder system was used to determine the emission rates from PCS (green sand mold, PUCB core). I've never heard of the product and I don't know why it was selected.

I'll find the core making emission information and send over to you within the hour.

mad river strategies llc
Craig S. Schmeisser
Mad River Strategies, LLC
craig.schmeisser@madriverstrategies.com
614.425.6392

Rustillo 4175 Evaporation Study				
Time	***Weight** (No Tare Including Cylinder)	**Volume** (mL) (5 mL increments)	**RH (%)**	**Temp (°F)**
9:45 AM	0.95	210	20%	71°
11:45 AM	0.95	210	23%	71°
1:45 PM	0.95	210	23%	71°
3:45 PM	0.90	210	23%	72°
5:45 PM	0.90	210	23%	72°
7:45 PM	0.90	210	23%	72°
9:45 PM	0.90	210	23%	72°
11:45 PM	0.90	210	22%	72°
1:45 AM	0.90	210	22%	72°
3:45 AM	0.90	210	22%	72°
5:45 AM	0.90	210	22%	71°
7:45 AM	0.90	210	22%	71°
9:45 AM	0.90	210	22%	71°
11:45 AM	0.90	210	22%	71°

*We conclude 0 < 0.05 lb (23) gram evaporation over 24 hours
Scale sensitivty is 0.05

Dry graduated cylinder weight = 0.45 lb

ANALYTICAL REPORT

June 10, 2021

ENSAFE, Bowling Green, KY

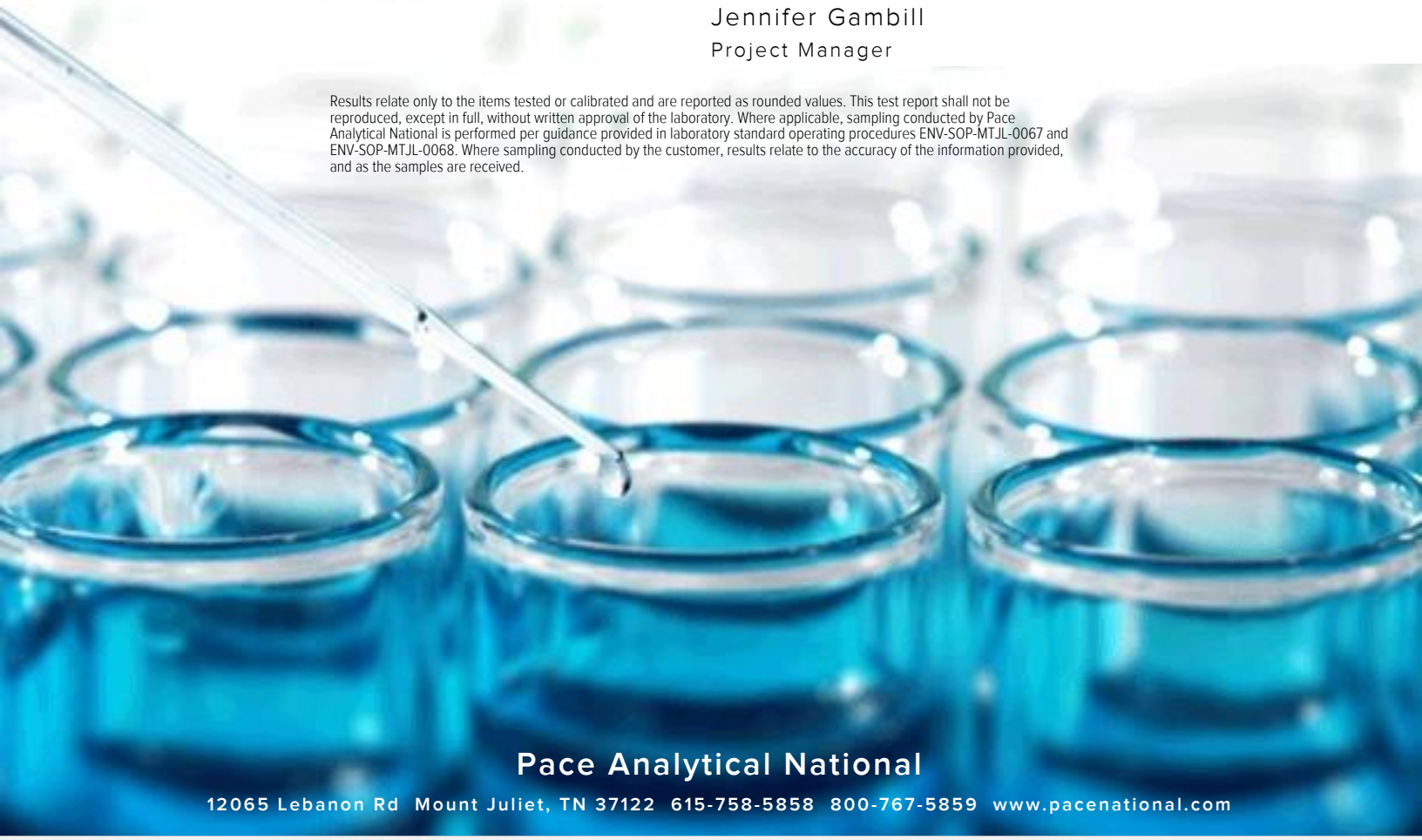
Sample Delivery Group:	L1359379
Samples Received:	05/28/2021
Project Number:	
Description:	0888828410

Report To: Joe Willcox
1148 College Street
Bowling Green, KY 42101

Entire Report Reviewed By:

Jennifer Gambill
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



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SAMPLE SUMMARY

FETTLING L1359379-01 Solid

Collected by: Eddie G Butler | Collected date/time: 05/20/21 13:45 | Received date/time: 05/28/21 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1680750	1	06/03/21 16:19	06/04/21 11:58	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1680437	10	06/08/21 17:40	06/10/21 10:54	EL	Mt. Juliet, TN

CORE L1359379-02 Solid

Collected by: Eddie G Butler | Collected date/time: 05/20/21 13:41 | Received date/time: 05/28/21 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1680750	1	06/03/21 16:19	06/04/21 12:14	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1680437	1	06/08/21 17:40	06/10/21 08:37	EL	Mt. Juliet, TN

SAND L1359379-03 Solid

Collected by: Eddie G Butler | Collected date/time: 05/20/21 13:50 | Received date/time: 05/28/21 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1680750	1	06/03/21 16:19	06/04/21 12:16	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1680437	1	06/08/21 17:40	06/10/21 08:40	EL	Mt. Juliet, TN

MELT L1359379-04 Solid

Collected by: Eddie G Butler | Collected date/time: 05/20/21 13:54 | Received date/time: 05/28/21 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1680750	1	06/03/21 16:19	06/04/21 12:19	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1680437	10	06/08/21 17:40	06/10/21 10:57	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1680437	50	06/08/21 17:40	06/10/21 14:27	EL	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jennifer Gambill
Project Manager

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.0180	0.0400	1	06/04/2021 11:58	WG1680750

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		5.44	20.0	10	06/10/2021 10:54	WG1680437
Arsenic	19.4	J	5.18	20.0	10	06/10/2021 10:54	WG1680437
Beryllium	U		0.315	2.00	10	06/10/2021 10:54	WG1680437
Cadmium	0.863	J	0.471	5.00	10	06/10/2021 10:54	WG1680437
Chromium	1360		1.33	10.0	10	06/10/2021 10:54	WG1680437
Cobalt	26.0		0.811	10.0	10	06/10/2021 10:54	WG1680437
Lead	18.2		2.08	5.00	10	06/10/2021 10:54	WG1680437
Manganese	8650		1.33	10.0	10	06/10/2021 10:54	WG1680437
Nickel	375		1.32	20.0	10	06/10/2021 10:54	WG1680437
Selenium	18.6	J	7.64	20.0	10	06/10/2021 10:54	WG1680437

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.0180	0.0400	1	06/04/2021 12:14	WG1680750

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		0.544	2.00	1	06/10/2021 08:37	WG1680437
Arsenic	1.62	J	0.518	2.00	1	06/10/2021 08:37	WG1680437
Beryllium	0.529		0.0315	0.200	1	06/10/2021 08:37	WG1680437
Cadmium	0.111	J	0.0471	0.500	1	06/10/2021 08:37	WG1680437
Chromium	11.6		0.133	1.00	1	06/10/2021 08:37	WG1680437
Cobalt	1.69		0.0811	1.00	1	06/10/2021 08:37	WG1680437
Lead	9.15		0.208	0.500	1	06/10/2021 08:37	WG1680437
Manganese	248		0.133	1.00	1	06/10/2021 08:37	WG1680437
Nickel	5.04		0.132	2.00	1	06/10/2021 08:37	WG1680437
Selenium	U		0.764	2.00	1	06/10/2021 08:37	WG1680437

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.0180	0.0400	1	06/04/2021 12:16	WG1680750

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		0.544	2.00	1	06/10/2021 08:40	WG1680437
Arsenic	3.48		0.518	2.00	1	06/10/2021 08:40	WG1680437
Beryllium	1.07		0.0315	0.200	1	06/10/2021 08:40	WG1680437
Cadmium	0.112	J	0.0471	0.500	1	06/10/2021 08:40	WG1680437
Chromium	9.65		0.133	1.00	1	06/10/2021 08:40	WG1680437
Cobalt	2.97		0.0811	1.00	1	06/10/2021 08:40	WG1680437
Lead	18.5		0.208	0.500	1	06/10/2021 08:40	WG1680437
Manganese	152		0.133	1.00	1	06/10/2021 08:40	WG1680437
Nickel	6.46		0.132	2.00	1	06/10/2021 08:40	WG1680437
Selenium	1.64	J	0.764	2.00	1	06/10/2021 08:40	WG1680437

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	1.30		0.0180	0.0400	1	06/04/2021 12:19	WG1680750

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		5.44	20.0	10	06/10/2021 10:57	WG1680437
Arsenic	75.1		5.18	20.0	10	06/10/2021 10:57	WG1680437
Beryllium	U		0.315	2.00	10	06/10/2021 10:57	WG1680437
Cadmium	51.3		0.471	5.00	10	06/10/2021 10:57	WG1680437
Chromium	491		1.33	10.0	10	06/10/2021 10:57	WG1680437
Cobalt	36.1		0.811	10.0	10	06/10/2021 10:57	WG1680437
Lead	5140		2.08	5.00	10	06/10/2021 10:57	WG1680437
Manganese	34000		6.65	50.0	50	06/10/2021 14:27	WG1680437
Nickel	142		1.32	20.0	10	06/10/2021 10:57	WG1680437
Selenium	26.7		7.64	20.0	10	06/10/2021 10:57	WG1680437

Method Blank (MB)

(MB) R3663337-1 06/04/21 11:26

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Mercury	U		0.0180	0.0400

Laboratory Control Sample (LCS)

(LCS) R3663337-2 06/04/21 11:28

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.500	0.498	99.6	80.0-120	

L1359035-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1359035-01 06/04/21 11:35 • (MS) R3663337-3 06/04/21 11:38 • (MSD) R3663337-4 06/04/21 11:40

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.500	U	0.457	0.471	91.5	94.2	1	75.0-125			2.93	20

L1359035-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1359035-09 06/04/21 11:43 • (MS) R3663337-5 06/04/21 11:45 • (MSD) R3663337-6 06/04/21 11:48

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.500	U	0.486	0.509	97.1	102	1	75.0-125			4.77	20

Method Blank (MB)

(MB) R3665484-1 06/10/21 07:18

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Antimony	U		0.544	2.00
Arsenic	U		0.518	2.00
Beryllium	U		0.0315	0.200
Cadmium	U		0.0471	0.500
Chromium	U		0.133	1.00
Cobalt	U		0.0811	1.00
Lead	U		0.208	0.500
Manganese	U		0.133	1.00
Nickel	U		0.132	2.00
Selenium	U		0.764	2.00

Laboratory Control Sample (LCS)

(LCS) R3665484-2 06/10/21 07:21

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Antimony	100	93.0	93.0	80.0-120	
Arsenic	100	92.2	92.2	80.0-120	
Beryllium	100	97.1	97.1	80.0-120	
Cadmium	100	93.0	93.0	80.0-120	
Chromium	100	98.8	98.8	80.0-120	
Cobalt	100	99.2	99.2	80.0-120	
Lead	100	98.2	98.2	80.0-120	
Manganese	100	97.1	97.1	80.0-120	
Nickel	100	101	101	80.0-120	
Selenium	100	92.9	92.9	80.0-120	

L1359349-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1359349-11 06/10/21 07:24 • (MS) R3665484-5 06/10/21 07:33 • (MSD) R3665484-6 06/10/21 07:36

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	100	U	50.8	52.5	50.8	52.5	1	75.0-125	J6	J6	3.29	20
Arsenic	100	12.5	113	104	101	91.2	1	75.0-125			8.88	20
Beryllium	100	0.448	92.8	91.8	92.4	91.4	1	75.0-125			1.10	20
Cadmium	100	0.0816	89.7	88.6	89.7	88.5	1	75.0-125			1.25	20
Chromium	100	9.56	103	101	93.7	91.8	1	75.0-125			1.90	20
Cobalt	100	12.3	111	105	98.4	92.8	1	75.0-125			5.17	20
Lead	100	13.3	115	109	101	95.2	1	75.0-125			5.52	20

L1359349-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1359349-11 06/10/21 07:24 • (MS) R3665484-5 06/10/21 07:33 • (MSD) R3665484-6 06/10/21 07:36

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Manganese	100	457	647	518	191	61.8	1	75.0-125	V	J3 V	22.1	20
Nickel	100	14.3	119	115	105	100	1	75.0-125			4.06	20
Selenium	100	U	87.3	87.9	87.3	87.9	1	75.0-125			0.758	20

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
V	The sample concentration is too high to evaluate accurate spike recoveries.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

CHAIN-OF-CUSTODY Analytical Request Document

Pace Analytical®

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here

ALL SHADED AREAS are for LAB USE ONLY

Company: Fritz Winter North America, LP	Billing Information: EnSafe AP - Memphis
Address: 1 Fritz Winter Drive, Franklin, KY 42134	
Report To: Eddie G Butler	Email To: eddie.butler@fritzwinter.us
Copy To: jwillcox@ensafe.com	Site Collection Info/Address: Fritz Winter-NA/Same
Customer Project Name/Number: 088828410	State: KY County/City: Simpson Time Zone Collected: [ ] PT [ ] MT [✓] CT [ ] ET
Phone: 270-813-4000 x172 Email: eddie.butler@fritzwinter.us	Site/Facility ID #:
Collected By (print): Eddie G Butler	Purchase Order #: Quote #:
Collected By (signature):	Turnaround Date Required:
Sample Disposal: [✓] Dispose as appropriate [ ] Return [ ] Archive: _____ [ ] Hold: _____	Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)

Compliance Monitoring? [✓] Yes [ ] No

DW PWS ID #:

DW Location Code:

Immediately Packed on Ice: [ ] Yes [✓] No

Field Filtered (if applicable): [ ] Yes [ ] No

Analysis: _____

Container Preservative Type **

Lab Project Manager: LB59379

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____

Analyses

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Total Metals (Sb,As,Be,Cd,Cr,Co,Pb,Mn,Hg,Ni,Se)	
Fettling	SL	Grab	5/20/21	1:45pm					X	-01
Core	SL	Grab	5/20/21	1:41pm					X	-02
Sand	SL	Grab	5/20/21	1:50pm					X	-03
Melt	SL	Grab	5/20/21	1:54pm					X	-04

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y	N	NA
Custody Signatures Present	Y	N	NA
Collector Signature Present	Y	N	NA
Bottles Intact	Y	N	NA
Correct Bottles	Y	N	NA
Sufficient Volume	Y	N	NA
Samples Received on Ice	Y	N	NA
VOA - Headspace Acceptable	Y	N	NA
USDA Regulated Soils	Y	N	NA
Samples in Holding Time	Y	N	NA
Residual Chlorine Present	Y	N	NA
Cl Strips: _____			
Sample pH Acceptable	Y	N	NA
pH Strips: _____			
Sulfide Present	Y	N	NA
Lead Acetate Strips: _____			

LAB USE ONLY:
Lab Sample # / Comments:

Customer Remarks / Special Conditions / Possible Hazards:

Deliver Results in mg/kg

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #:

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:

Temp Blank Received: Y N NA

Therm ID#: _____

Cooler 1 Temp Upon Receipt: 4mb oC

Cooler 1 Therm Corr. Factor: _____ oC

Cooler 1 Corrected Temp: _____ oC

Comments:

Relinquished by/Company: (Signature) FW-NA	Date/Time: 5/21/21 4:30 PM	Received by/Company: (Signature)	Date/Time: 5/21/21 16:30
Relinquished by/Company: (Signature)	Date/Time: 5/28/21 15:00	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time: 5/28/21 1500

B127

Acctnum:

Template:

Prelogin:

PM:

PB:

Trip Blank Received: Y N NA

HCL MeOH TSP Other

Non Conformance(s): YES / NO

Page: _____ of: _____

Appendix T
Air Dispersion Modeling Electronic Files

Appendix T – Electronic files of air dispersion modeling analysis to be submitted separately.

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Eddie Butler
EHS Manager
Fritz Winter North America, LP
1 Fritz Winter Drive
Franklin, Kentucky 42134

January 12, 2023

Michelle McCloskey
Department of Environmental Protection
Division for Air Quality
300 Sower Boulevard
Frankfort, Kentucky 40601

Subject: PSD Construction Permit/Title V Operating Permit Application
Fritz Winter North America, LP

Source ID:	21-213-00064
Agency Interest:	129745
Activity:	APE20220003
Permit:	V-16-022-R1

Dear Michelle McCloskey:
Please find the following response to the Division for Air Quality (DAQ) information request dated August 31, 2022.

Emission Calculations

1. Form DEP7007N states that the emission calculations are provided in the emission calculations portion of the permit application. The following information in Appendix C of the submitted permit application must be submitted for form DEP7007N to be deemed complete:

    a. For pages *174, 180, 182, 184, 186, 190, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211,213, 215, 217, 219, 221, 223, 225, 233, 235, 237, 239, 245, 247, 249, 251, 253, 255, 259,261, 263, 284, & 286* of the submitted permit application:

        i. Control efficiencies for each controlled pollutant.

Response:

As explained below, control efficiencies are not used to calculate stack emissions of any pollutant [in this air permit application or in prior air permit applications], excluding the control of amine catalyst used at the PUCB Core Machines #1-#4 (EU39-EU42).

Filterable particulate matter (including PM_{10} and $PM_{2.5}$) air pollution control devices (APCDs) identified in the application include bin vent fabric filters (for silos), booth filters (for the paint lines), cartridge collectors (for Machining and Perforation Lines), other fabric filters (for the two snag grinders) and baghouses. See Attachment #1 that includes revised Tables 2-2 and 2-3 [Perforation Line #1 (EU84) has been added] that are provided on page 92 and 93,

respectively of the air permit application for emission unit air pollution control device assignments.

The other APCD type identified in the application is an Acid Scrubber (CU07) for the control of the amine catalyst used in the phenolic urethane cold box (PUCB) core making process (PUCB Core Machine #1-#4, EU39-EU42). For the Acid Scrubber (CU07), a 98% control efficiency for the amine catalyst is included in the emission factor used to quantify VOC emissions. [See response to comment 8 below]

To calculate controlled PM, PM_{10} and $PM_{2.5}$ emissions (i.e., stack emissions), the application uses the same methodology as the original application. The APCD air volume (in acfm) and BACT-established outlet grain loadings (in gr/dscf) along with the stack temperature are used to determine hourly [Eq. 1] and annual [Eq. 2] stack emission rates from each control device. [differences in standard to actual barometric pressure and moisture content are negligible and therefore ignored]. Again Tables 2-2 and 2-3 identify the emission unit air pollution control assignments.

$$\boldsymbol{PM}\left(\frac{\boldsymbol{lb}}{\boldsymbol{hr}}\right) = \frac{\boldsymbol{gr}}{\boldsymbol{dscf}} \times \boldsymbol{acfm} \times (\mathbf{460}^{\circ}\mathrm{F} + \mathbf{70}^{\circ}\mathrm{F})/(\mathbf{460}^{\circ}\mathrm{F} + \boldsymbol{stack\ temp}^{\circ}\mathrm{F}) \quad \textbf{[Eq. 1]}$$

$$\boldsymbol{PM}\,(\boldsymbol{tpy}) = \boldsymbol{PM}\left(\frac{\boldsymbol{lb}}{\boldsymbol{hr}}\right) \times \frac{\boldsymbol{hours}}{\boldsymbol{year}} \quad \textbf{[Eq. 2]}$$

Using an emission factor and an APCD control efficiency to quantify stack particulate emissions would not be appropriate as inlet conditions (inlet mass emissions, moisture content, particle size, etc.) are unknown. To answer the question, provided the "BACT identified" outlet grain loading for each PM air pollution control device, one would expect PM control efficiencies in the area of 99.5%.

ii. Total emission rates for all emitted pollutants in lb/hr, and tons per year;

Response:

As provided in the original and initial air permit application revision, Attachment #2 provides lb/hr and tons per year emission rates using Eq. 1 and Eq. 2, the estimated air volume from each emissions unit and the BACT identified outlet grain loading.

The total lb/hr and tons/yr differ somewhat from the original application because the secondary capture and control of combustion emission sources are not considered [due to lack of design air volumes].

iii. Method of emission factor calculations.

Response:

Please see Eq. 1 and Eq. 2 as well as the notes at the bottom of each worksheet. See Attachment #2.

b. Some of the current emission units have been updated to include additional pollutants, or updated emission factors. Please provide the basis for new emission factors for each applicable pollutant emitted from the following emission units located in Appendix C:
   i. EUs 07, 08, 09, 10, 13, 17, 19, 20, 21, 33, 39, 40, 41, 42, 45, 35A, 35B, 36 50, 51, 52,53, 57, 59, 60, 61, 62, 63, 64, 65, 66, & 84.

Response:

Overall – As PM, PM_{10} and $PM_{2.5}$ BACT are established for each APCD, it is beneficial to review the total emission rates at the control device level, therefore please see the emission rates for each control device as provided in the air permit application. Emission unit specific PM emission rates in Attachment #2 are provided only to illustrate compliance with 401 KAR 59:010, Section 3(2).

In addition to the above, this response assumes EU67 (Perforation Line #2) in lieu of the above comment-identified EU84 (Perforation Line #1) [which is addressed in a subsequent application].

Induction Furnace #1 (EU07) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 178 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

Induction Furnace #2 (EU08) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 180 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

Induction Furnace #3 (EU09) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 182 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

Induction Furnace #4 (EU10) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 184 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

Hot Metal Transfer (EU13) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

Melt and Core/Mold Baghouse Waste Dust Silo (EU17) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

Mold Silica Sand Silo (EU19) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

Blend Silo (EU20) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

Bentonite Silo (EU21) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit

application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

Mold Making #1 (EU33) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

PUCB Core Machine #1 (EU39) - See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and acid scrubber air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The acid scrubber air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

VOC emission rates for each PUCB Core Machine is determined based on the use of resin and catalyst; and then VOC emissions related to the use of core release. See the response to 8. for detail regarding the emission factors used.

PUCB Core Machine #2 (EU40) - See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and acid scrubber air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The acid scrubber air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

VOC emission rates for each PUCB Core Machine is determined based on the use of resin and catalyst; and then VOC emissions related to the use of core release. See the response to 8. for detail regarding the emission factors used.

PUCB Core Machine #3 (EU41) - See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and acid scrubber air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The acid scrubber air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note:

Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

VOC emission rates for each PUCB Core Machine is determined based on the use of resin and catalyst; and then VOC emissions related to the use of core release. See the response to 8. for detail regarding the emission factors used.

<u>PUCB Core Machine #4 (EU42) -</u> See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and acid scrubber air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The acid scrubber air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

VOC emission rates for each PUCB Core Machine is determined based on the use of resin and catalyst; and then VOC emissions related to the use of core release. See the response to 8. for detail regarding the emission factors used.

<u>Core Dryer #2 (EU45)</u> – Provided the buildings are under negative pressure, it is assumed any combustion related PM, PM_{10} and $PM_{2.5}$ emissions are secondarily captured by an exhaust point subsequently routed to a baghouse. See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments.

See the notes at the bottom of the worksheet on page 229 of the application for the basis of non-PM emission rates.

<u>Core Silica Sand Silo A (EU35A)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

<u>Core Silica Sand Silo B (EU35B)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

<u>Core Sand Handling and Preparation (EU36)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air

volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Pouring #1 (EU50)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 233 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Pouring #2 (EU51)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 235 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Mold Cooling (EU52)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 237 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Shakeout Conveyor (EU53)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 239 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

Sand Plant Baghouse Waste Dust Silo (EU57) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

Casting Cooling (EU59) – – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

Sorting Conveyor (EU60) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

Steel Shot Blasting #1 (EU61) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

Steel Shot Blasting #2 (EU62) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Fettling Baghouse Waste Dust Silo (EU63)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

<u>Auto Grinding #1 (EU64)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Auto Grinding #2 (EU65)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Machining Lines (EU66)</u> - See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and cartridge collector air volume are used to determine the emission rate. See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments. See page 320 of the air permit application for quantification of the emissions.

<u>Perforation Line #2 (EU67)</u> - See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and cartridge collector air volume are used to determine the emission rate.

This unit was installed following submittal of the air permit application that is the subject of this response. Please see the permit application for the emission calculation methodology.

2. Form DEP7007GG states that the control efficiencies of the control units operate with a control efficiency greater than or equal to 99%. Form DEP7007N states that the estimated control efficiency for each control device is greater than or equal to 99.5%. According to the Kentucky emission inventory system, each control device has a different control efficiency, often less than

99%. In order for forms DEP7007GG to be deemed complete and accurate, all control equipment information should be included in the form DEP7007GG.

a. Please update page 884 of the permit application, the form needs to be completed for all control devices, and all boxes should be completed.

Response:

Attachment #3 includes the updated DEP7007GG that changes the pollutant removal % from 99 to 99.5+ to match Form DEP7007N for the fabric filters.

3. For EUs 19, 20, 21, 35A, 35B, 57, and 63:

a. Please confirm that there is no condensable particulate expected from each emission unit where the application identifies that PM is assumed to be equal to PM2.5 and PM10.

Response:

The Mold Silica Sand Silo (EU19), Blend Silo (EU20), Bentonite Silo (EU21), Core Silica Sand Silo A (EU35A) and Core Silica Sand Silo B (EU35B) receive virgin solid material pneumatically conveyed from trucks. Temperatures are ambient and no condensable particulate matter is expected.

The Sand Plant Baghouse Waste Dust Silo (EU57) and Fettling Baghouse Waste Dust Silo (EU63) are receiving solid material (baghouse dust from CU06 and CU11) at ambient conditions. No condensable particulate matter is expected.

b. Are the provided emission factors from Ohio EPA RACM pre or post-control emission factors? Any additional documentation should be provided.

Response:

See above response to b. regarding the emission calculation methodology for these emission units. In summary, see Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 in Attachment #1 for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations. As the processes are enclosed there are no fugitive emissions identified.

The identified emission factors are provided only in the event it is necessary to quantify fugitive emissions.

The emission factors from Ohio EPA RACM are pre-controls. The foundry and cement (silo)-specific sections of Ohio EPA RACM is provided as Attachment #4.

4. For EUs 33, 34, and 43:

a. Why was stack test data emission factors not used for the emission units, rather than the provided emission factors from Ohio RACM, Table 2.7-1.

Response:

Mold Making #1 (EU33) and Mold Making #2 (EU34) have either no or limited amounts of particulate matter. As indicated on the emission calculation sheet, any emissions from these operations would be captured by the Core/Mold Baghouse (CU08). Emission factors are only provided in the event fugitive emissions are to be quantified. Eq. 1 and Eq. 2 are used to determine emission rates in lb/hr and tpy at both the APCD and emission unit level (as provided in Attachment #2).

Core Wash Station #1 (EU43) emissions are associated with the VOC content of the wash. VOC emissions are determined based on a mass balance of the wash VOC content.

b. Please confirm that there is no condensable particulate expected from each emission unit where PM is equal to PM2.5 and PM10.

Response:

For Mold Making #1 (EU33) and Mold Making #2 (EU34), these operations process prepared green sand into molds. The molds are prepared solid material at ambient temperature and are therefore not expected to have condensable particulate matter.

As shown in Table 2-2 and 2-3, emissions are secondarily captured by the identified air pollution control device. Condensable particulate matter are quantified for all operations at the control device stack [where the condensable matter is measured and where compliance with the BACT emission limits are demonstrated].

Core Wash Station #1 (EU43) emissions are only associated with the evaporative VOCs from the wash. No filterable or condensable particulate emissions are expected from the operation.

c. Are the provided emission factors from Ohio EPA RACM pre or post-control emission factors? Again, additional documentation thereof would be useful.

Response:

As discussed above, the convention of the current Air Permit, the emissions from these operations are estimated based on BACT/outlet grain loadings and air volumes [see Eq. 1 and Eq. 2]. The emission factors provided are only provided in the event it is necessary to provide fugitive emission calculations.

The emission factors from Ohio EPA RACM are pre-controls. The foundry- and cement (silo)-specific section of Ohio EPA RACM has been provided as Attachment #4.

5. Please provide emission factors for both breathing and working losses along with the already provided Diesel Storage Tank properties on page 283 of the permit application for EU 75.

Response:

As TANKS emissions Estimation Software is no longer supported by USEPA, as recommended by USEPA, the equations and algorithms specified in AP-42 Chapter 7 is used for estimating VOC emissions from the Diesel Storage Tank (EU75). Breathing losses are estimated at 0.2551 lb VOC/year per 24,000 gallons or 0.011 lb VOC/1,000 gallons. Working losses are determined to be 137.3876 lb VOC/year or 5.724 lb VOC/1,000 gallons.

6. For EUs 79, 80, 81, and 82 VOC emission factors listed in Appendix C, please correct the emission factor to lb/ton.

Response:

[Aside: Likely Core Wash Station #1 (EU43) should be identified in this comment]

VOC emissions from Core Wash Station #1 (EU43), Core Wash Station #2 (EU79), Core Wash Station #3 (EU80), Core Wash Station #4 (EU81) and Rust Prohibitive (EU82) are based on the weight of material used in "tons/hr" (based on hourly usage capacity) and "tons/year" (based on an annual usage limit restriction) and the VOC content of the material. As indicated on the emission calculation worksheets, the emission factor is provided in "% by wt." The hourly and annual VOC emissions are determined by multiplying the usage weight (in tons/hr and tons/year) by the % by weight VOC.

7. For each unit's HAP emission calculation sheet in Appendix C, please include an emission factor for every potential HAP for each corresponding emission unit. If no HAPs are expected, please do not include a HAP emission calculation sheet, instead, provide information regarding the reason HAPs are not expected.

Response:

To determine the emissions of inorganic HAP/TAC emissions, baghouse dust analysis is to quantify the emissions of HAPs/TACs from all types of fabric filters (i.e., baghouses, cartridge collectors, etc.). Please reference Table 2-2 and 2-3 for the particular particulate matter control device and associated inorganic HAP emissions.

Other HAP emissions are either grouped (e.g., pouring, cooling and shakeout) to improve accuracy or provided at the emission unit level.

Rather than address workbook formatting issues, Attachment #5 provides a basis for the identification of HAPs from a specific operation.

8. The Division's current emissions inventory lists three process IDs for each of EUs 39, 40, 41, and 42: 1000 ft3 catalyst processed, Pounds Release Processed, and Pounds Binder Processed. However, the submitted application does not include the VOCs from the binder processed. Please clarify the absence of the VOC from the binder processing in the application. With your response, please provide detailed calculations for the new VOC emission factor listed on pages 213, 217, 221 and 225 of the submitted permit application.

Response:

To quantify the VOC emissions from the PUCB Core Machines [PUCB Core Machine #1 (EU39), PUCB Core Machine #2 (EU40), PUCB Core Machine #3 (EU41) and PUCB Core Machine #4 (EU41)], the emissions from the binder system (resin and catalyst) and the emissions from the core release are quantified on separate worksheets [i.e., there are two worksheets per core machine). The emissions from the core release are determine using the maximum hourly and annual core release and the maximum VOC content (as identified by vendor provided information). This is documented on the core release worksheet.

Regarding the resin and catalyst VOC emission factor, the factor is the additive sum of the VOC emission rate for the resin plus the VOC emission rate for the catalyst.

The VOC emission factor for the resin is determined by the following:

0.65 lb/ton of sand (per VOC OCMA weight loss test)
125% (emission factor adjustment based on stack test results)
1.25/1 (adjustment to OCMA weight loss test to reflect the FW maximum resin usage of 1.25% divided by the resin usage during the OCMA weight loss test.
= 1.016 lb/ton of sand

The VOC emission factor for the catalyst is determined by the following:

2000 (lb/ton)
1.25% (resin% usage based on sand)
10% (catalyst % based on resin)
=2.5 lb catalyst per ton of sand
1-98% (acid scrubber 98% control efficiency of amine catalyst)
=0.05 lb/ton of sand

Total VOC emission factor for resin and catalyst is 1.016 + 0.05 = 1.066 lb/ton of sand

Permit Modifications

1. The Division may consider grouping emission units if the processes operate in sequence in a continuous manner. Otherwise, individual processes need to be in the permit application and identified separately, if there are requested changes or to update information. Please provide additional information to support combining emission units into the requested groups. According to the permit application the requested emission unit groups are as follows:

    a. On page 915 of the permit application, EU 01 will include EU 02;

Response:

Scrap Steel Storage (EU01) and Alloy Storage (EU02) are co-located under roof on the Northeast side of the plant. The request is that both EU01 and EU02 be combined into the Charge Handling emission unit EU01. The request to combine these emission units is being made due to an error in the original air permit application submitted to DAQ.

The "charge materials" include scrap, fluxes and alloys some of which are received in bulk containers. . The "charge material" are deposited (i.e., handled) into one of four charge hoppers which carry the "charge" through roll-up doors to one of the four furnaces. The receiving and storage of all "charge materials" are addressed under the same SCC (30400315) for "charge handling." Should it be necessary to quantify the uncontrolled emissions for "charge handling", the emissions are determined based on the "tons metal charged" and not the scrap, flux or alloys received. The identification of the "Charge Handling" emission unit that includes the receipt and storage of scrap, flux and alloys is industry practice.

b. On page 916 of the permit application, EU 13 will include EU 14;

Response:

It is requested that Transport Ladle #1 (EU13) and Transport Ladle #2 (EU14) be combined into a single operation identified as Hot Metal Transfer (EU13) due to an error in the initial air permit application submitted to DAQ.

Emissions result from the transfer of molten metal from the induction furnaces to the pouring furnace. Due to abrasion and thermal degradation, the ladle refractory must be repaired. When a ladle is taken out of service due to degradation, a repaired ladle takes its place. Whether there is one, two or even three ladles, the uncontrolled emissions from Hot Metal Transfer would be calculated based on the molten metal transferred and not be whether the metal is transported by any particular ladle. The identification of the emission unit Hot Metal Transfer is industry practice.

c. On pages 917, 918 and 919 of the permit application, EU 22 will include EUs 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 48 and 49;

Response:

Please note there is no EU25 in the current air permit or in the most recent application. In addition to the above identified emission units, the current air permit application has requested the Sand Cooler (EU54), Used Mold and Core Sand Storage (EU55) and Sand Screening (EU56) be combined into a single emissions unit Mold Sand Handling and Preparation (EU22). This request is being made to correct the initial air permit application submitted to DAQ.

The Mold Silica Sand Bin (EU22), Blend Bin (EU23), Bentonite Bin (EU24), Mold Silica Sand Weigh Hopper (EU26), Blend Weigh Hopper (EU27), Bentonite Weigh Hopper (EU28), Dust Weigh Hopper (EU29), Green Sand Mixer #1 (EU30), Green Sand Mixer #2 (EU31), Green Sand Mixer #3 (EU32), Mold Assembly #1 (EU48), Mold Assembly #2 (EU49), have been requested to be combined into Sand Cooler (EU54), Used Mold and Core Sand Storage (EU55) and Sand Screening (EU56) be combined into a single emissions unit Mold Sand Handling and Preparation (EU22) and designated as EU22.

Mold Sand Handling and Preparation is a continuous operation, where sand is returned for preparation and then reuse by Mold Making #1 (EU33) or Mold Making #2 (EU34). Sand is

transported between equipment via conveyors, elevators and gravity. The emission unit includes sand storage (in bins and hoppers), sand processing (through Screens, Coolers and Mixers) and subsequently reused as molding sand. The return sand is supplemented with new additions of silica sand, bentonite and a blend of generally carbonaceous materials to form new molds as Mold Making #1 (EU33) and Mold Making #2 (EU34). Uncontrolled emissions for the equipment at large is identified under SCC 30400350, "Sand Grinding/Handling."

d. On page 18 of the permit application, EU 36 will include EUs 37 and 38; and

Response:

These 3 units, Sand Classifier (EU36), Silica Sand Bin (UE37) and Weigh Hopper (EU38) are combined into a single unit identified as Core Sand Handling and Preparation.

The units are a continuous operation. When sand is needed for core making, sand is automatically and pneumatically conveyed from Core Silica Sand Silo A (EU35A) or Core Silica Sand Silo B (EU35b) to the Sand Classifier for sizing. Once sized, the sand is gravity fed to the Sand Bin and then gravity fed to the Weigh Hopper prior to being discharged to a mixer where the weighed sand is mixed with resin.

The above identified units are stacked on top of each other above the core machine and are not necessarily identifiable from one another. The Weigh Hopper receives sand directly from the Sand Bin. Binder is added and mixed to be delivered to the Core Machine calling for sand (either Core Machine #1 or Core Machine #2).

e. On page 921 of the permit application, EU 66 will include EU 67.

Response:

While other portions of the air permit application is correct, Page 921 of the permit application should not have identified combining existing Machining Lines (EU66) and Perforation Line (EU67) into a single emission unit.

[Please note subsequent to submittal of this air permit application, a permit was received for Perforation Line #1 (EU84). FWNA would like to identify EU67 as Perforation Line #2.

2. Due to the volume of changes requested, to help with timely processing of the permitting action, the Division requests that a red-line mark-up copy of the permit be submitted with your reply.

Response:

See Attachment #6

3. Does the facility still require the alternate operating scenarios included in Section H of the permit, or can they be removed because the construction phases have been completed?

Response:

No, the alternative operating scenarios included in Section H of the permit can be removed. The existing air permit identified emission unit, Paint Booth #3 (EU70), is not included in this permit application. Please incorporate Alternate Scenario #1 into the main permit for Emission Units Paint Line #1 (EU71), Paint Line #2 (EU69) and Paint Line #3 (EU68).

Additional Information

1. On page 263 of the permit application and elsewhere, Perforation Line 1 is designated as EU67. However, in a recent minor revision dated February 21, 2022, EU 84 – Perforation Line #1 was added into the Division's inventory. Please clarify if the facility only wants to change the description of an existing designation for EU 67 – Drilling and Milling - would the process of EU 67 be different or the same as the recently applied for EU 84?

Response:

The installation of Performance Line #1 (EU84) was not known prior to the submittal of the air permit application that is the subject of this response. During preparation of the air permit application for EU84 it was determined that the line would be identified as Perforation Line #1 and that the appropriate name for EU67 was Perforation Line #2.

The current description of 8 turning lathe lines (EU66) and 2 milling and drilling lines (EU67) is confusing as both car lines (7) and truck lines (2) all perform lathing, milling and drilling operations with some parts going the additional step at Perforation line 2 (a drilling operation).

2. Are building vents 01A, 01B, 02A, and 02B still constructed/installed? If they are, how are emissions prevented from passing through; are the vents are closed, how are they sealed? Are there any other egress points for emissions within the enclosed spaces near the vents?

Response:

Building Vent 01A is installed in the Fettling area. Buidling Vent 01B is installed near the Charge Handling area. Building Vent 02A is installed near the center of the Machining Building. Building Vent 02B is not installed.

Building Vents 01A and 01B are not used and the louvers are closed as negative pressure is maintained in the Foundry Building.

Following the study of the ventilation in Machining Building as it pertains to the quality of our coating operations, a determination was made that Vent 02A would not be used and the louvers would remain closed.

Aside: There are two other vents installed in the Foundry Building. One Building Vent is near Building Vent 01A near the Charge Handling Area and the other is near the location of the Electric Induction Furnaces (EU07 – EU10). Neither are used and louvers are closed. Negative pressure is maintained in the Foundry.

3. Where does the facility store waste dust from the baghouses?

Response:

Both the Melt Baghouse (CU01) and Core/Mold Baghouse (CU08) pneumatically convey baghouse dust to Melt and Core/Mold Baghouse Waste Dust Silo (EU17); The Sand Plant Baghouse (CU06) pneumatically conveys sand to the Sand Plant Waste Sand Silo (EU57) and the Fettling Baghouse (CU11) pneumatically convey sand to Fettling Baghouse Waste Dust Silo (EU63). [Note: As identified above both the Melt Baghouse (CU01) and the Core/Mold Baghouse (CU08) transport to the same waste silo, Melt Waste Dust Silo (EU17)]

Please contact me at eddie.butler@fritzwinter.us or at (270) 813-4000 should you have any questions regarding the attached response.

Respectfully submitted,

Eddie G Butler

Eddie G Butler
EHS Manager

Attachment #1
Revised Application Tables 2-2 and 2-3

Table 2-2
APCD, Stack ID and EU ID
Fritz Winter North America, LP
Franklin, KY

Control Device ID	Stack ID	Control Device and Stack Description	Emission Unit #1	Emission Unit #2	Emission Unit #3	Emission Unit #4	Emission Unit #5	Emission Unit #6	Emission Unit #7	Emission Unit #8	Emission Unit #9	Emission Unit #10	Emission Unit #11	Emission Unit #12	Emission Unit #13	Emission Unit #14	Emission Unit #15	Emission Unit #16	Emission Unit #17	Emission Unit #18	Emission Unit #19	Emission Unit #20
CU01	ST02	Melt Baghouse	EU01	EU02	~~EU03~~	~~EU04~~	EU05	EU06	EU07	EU08	EU09	EU10	~~EU11~~	~~EU12~~	EU13	EU14	EU15	EU16	EU18			
CU02	ST03	Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent	EU17																			
CU03	ST04	Mold Silica Sand Silo Bin Vent Filter	EU19																			
CU04	ST05	Blend Silo Bin Vent Filter	EU20																			
CU05	ST06	Bentonite Silo Bin Vent Filter	EU21																			
CU06	ST07	Sand Plant Baghouse	EU22	EU23	EU24	EU26	EU27	EU28	EU29	EU30	EU31	EU32	EU53	EU54	EU55	EU56						
CU07	ST08	Acid Scrubber	EU39	EU40	EU41	EU42																
CU08	ST09	Core/Mold Baghouse	EU33	EU34	EU36	EU37	EU38	EU43	EU44	EU45	EU46	EU47	EU48	EU49	EU50	EU51	EU52	EU59	EU79	EU80	EU81	EU83
~~CU09~~	~~ST10~~	~~Core/Mold Baghouse Waste Dust Silo Bin Vent Filter~~	~~EU58~~																			
CU10	ST11	Sand Plant Baghouse Waste Sand Silo Bin Vent Filter	EU57																			
CU11	ST12	Fettling Baghouse	EU60	EU61	EU62	EU64	EU65	EU83														
CU12	ST13	Fettling Baghouse Waste Dust Silo Bin Vent Filter	EU63																			
CU13a-CU13h	ST16	Machining Lines Cartridge Collectors	EU66																			
CU13i-CU13j	ST16	Perforation Line #2 Cartridge Collector	EU67																			
CU14	ST15A	Paint Line #3 Booth Filter	EU68																			
CU15	ST15B	Paint Line #2 Booth Filter	EU69																			
CU16	ST15C	~~Paint Line #4 Booth Filter~~	~~EU70~~																			
CU17	ST16	Paint Line #1 Booth Filter	EU71	EU82																		
CU19	ST09	Core Silica Sand Silo A Bin Vent Filter	EU35A																			
CU20	ST09	Core Silica Sand Silo B Bin Vent Filter	EU35B																			
NA	STG1	Emergency Generator #1	EU72																			
NA	STG2	Emergency Generator #2	EU73																			
NA	STG3	Emergency Generator #3	EU74																			
NA	STTK1	~~Gasoline Storage Tank Vent~~	~~EU75~~																			
NA	STTK1	Diesel Storage Tank Vent	EU75																			
NA	FUG	Paved Roadways	EU76																			
CU21	ST12	Snag Grinder #1 Fabric Filter	EU77																			
CU22	ST12	Snag Grinder #2 Fabric Filter	EU78																			
CU23	ST16	Perforation Line #1 Cartridge Collector	EU84																			

Denotes secondary capture of emissions
Denotes emissions from control device are captured and vented out an alternative control device stack
Denotes emission unit is combined with another existing emission unit with CY2021 air permit application
Denotes emission unit, air pollution control device and/or stack are not installed at time of permit application
Denotes emission unit, air pollution control device and/or stack are not installed at time of permit application and will be combined with another unit
Denotes secondary capture of emissions and emission unit is combined with another existing emission unit with CY2021 air permit application
~~strikethrough~~ Denotes emission unit, air pollution control device and/or stack will not be installed

Table 2-3
APCD, Stack ID and EU Description
Fritz Winter North America, LP
Franklin, KY

Control Device ID	Stack ID	Control Device and Stack Description	Emission Unit #1	Emission Unit #2	Emission Unit #3	Emission Unit #4	Emission Unit #5	Emission Unit #6	Emission Unit #7	Emission Unit #8	Emission Unit #9	Emission Unit #10	Emission Unit #11	Emission Unit #12	Emission Unit #13	Emission Unit #14	Emission Unit #15	Emission Unit #16	Emission Unit #17	Emission Unit #18	Emission Unit #19	Emission Unit #20
CU01	ST02	Melt Baghouse	Scrap Steel Storage	Alloy Storage	~~Scrap Drying~~	~~Scrap Cleaning~~	Refractory Burner #1	Refractory Burner #2	Induction Furnace #1	Induction Furnace #2	Induction Furnace #3	Induction Furnace #4	~~Holding Furnace #1~~	~~Holding Furnace #2~~	Transport Ladle #1	Transport Ladle #2	Pouring Furnace #1	Pouring Furnace #2	Refractory Curing Mobile Burner			
CU02	ST03	Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent	Melt and Core/Mold Baghouse Waste Dust Silo																			
CU03	ST04	Mold Silica Sand Silo Bin Vent Filter	Mold Silica Sand Silo																			
CU04	ST05	Blend Silo Bin Vent Filter	Blend Silo																			
CU05	ST06	Bentonite Silo Bin Vent Filter	Bentonite Silo																			
CU06	ST07	Sand Plant Baghouse	Mold Silica Sand Bin	Blend Bin	Bentonite Bin	Mold Silica Sand Weigh Hopper	Blend Weigh Hopper	Bentonite Weigh Hopper	Dust Weigh Hopper	Green Sand Mixer #1	Green Sand Mixer #2	Green Sand Mixer #3	Shakeout Conveyor	Sand Cooler	Used Mold & Core Sand Storage	Sand Screening						
CU07	ST08	Acid Scrubber	PUCB Core Machine #1	PUCB Core Machine #2	PUCB Core Machine #3	PUCB Core Machine #4																
CU08	ST09	Core/Mold Baghouse	Mold Making #1	Mold Making #2	Sand Classifier	Core Silica Sand Bin	Core Silica Sand Weigh Hopper	Core Wash Station #1	Core Dryer #1	Core Dryer #2	Core Dryer #3	Core Dryer #4	Mold Assembly #1	Mold Assembly #2	Pouring #1	Pouring #2	Mold Cooling	Casting Cooling	Core Wash Station #2	Core Wash Station #3	Core Wash Station #4	Rotary Sprue Cleaner and Return Conveyors
~~CU09~~	~~ST10~~	~~Core/Mold Baghouse Waste Dust Silo Bin Vent Filter~~	~~Mold Shop Baghouse Waste~~																			
CU10	ST11	Sand Plant Baghouse Waste Dust Silo Bin Vent Filter	Sand Plant Baghouse Waste																			
CU11	ST12	Fettling Baghouse	Sorting Conveyor	Steel Shot Blasting #1	Steel Shot Blasting #2	Auto Grinding #1	Auto Grinding #2	Rotary Sprue Cleaner and Return Conveyors														
CU12	ST13	Fettling Baghouse Waste Dust Silo Bin Vent Filter	Fettling Baghouse Waste Dust Silo																			
CU13a-CU13h	ST16	Machining Cartridge Collectors	Machining Lines (9)																			
CU13i-CU13j	ST16	Machining Cartridge Collectors	Perforation Line #2																			
CU14	ST15A	Paint Line #3 Booth Filter	Paint Line #3																			
CU15	ST15B	Paint Line #2 Booth Filter	Paint Line #2																			
~~CU16~~	~~ST15C~~	~~Paint Line #4 Booth Filter~~	~~Paint Line #4~~																			
CU17	ST16	Paint Line #1 Booth Filter	Paint Line #1	Rust Preventative Application																		
CU19	ST09	Core Silica Sand Silo A Bin Vent Filter	Core Silica Sand Silo A																			
CU20	ST09	Core Silica Sand Silo B Bin Vent Filter	Core Silica Sand Silo B																			
	STG1	Emergency Generator #1	Emergency Generator #1																			
	STG2	Emergency Generator #2	Emergency Generator #2																			
	STG3	Emergency Generator #3	Emergency Generator #3																			
	~~STTK-1~~	~~Gasoline Storage Tank Vent~~	~~Gasoline Storage Tank~~																			
	STTK-1	Diesel Storage Tank Vent	Diesel Storage Tank																			
	FUG	Paved Roadways	Paved Roadways																			
CU21	ST12	Snag Grinder #1 Fabric Filter	Snag Grinder #1																			
CU22	ST12	Snag Grinder #2 Fabric Filter	Snag Grinder #2																			
CU23	ST16	Perforation Line #1 Cartridge Collector	Perforation Line #1																			

Denotes secondary capture of emissions
Denotes emissions from control device are captured and vented out an alternative control device stack
Denotes emission unit is combined with another existing emission unit with CY2021 air permit application
Denotes emission unit, air pollution control device and/or stack are not installed at time of permit application
Denotes emission unit, air pollution control device and/or stack are not installed at time of permit application and will be combined with another unit
Denotes secondary capture of emissions and emission unit is combined with another existing emission unit with CY2021 air permit application
~~strikethrough~~ Denotes emission unit, air pollution control device and/or stack will not be installed

Attachment #2
Emission Unit Level PM Calculations

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Charge Handling
EU01

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Charge Handling
Control Device: Melt Baghouse (CU01) Note 4
SCC Code:
Control Device Outlet: 0.0020 gr/dscf
Airflow: 5,442 acfm
Stack Gas Temperature: °F

Facility Process Name:	**Criteria Pollutants**								
Charge Handling									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	0.07	0.07	0.06						
(source)	Note 1	Note 1	Note 2						
Capture Efficiency	100.00	100.00	100.00						
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.107	0.107	0.107						
Annual (TPY)	**0.471**	**0.471**	**0.471**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.107	0.107	0.107						
Annual (TPY)	**0.471**	**0.471**	**0.471**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Gutow Article, Modern Casting; January 1972; PM emissions from Raw material handling (0.04 lbs/ton) and charge makeup (0.03 lbs/ton) released to the atmosphere. All PM emission were conservatively assumed to be PM-10 emissions.
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to $PM_{2.5}$ ratio and uncontrolled PM emission factor.
Note 3: The Alloy Storage emission unit (EU02) is included in this emission unit.
Note 4: Secondary capture of fugitive emissions per testing conducted pursuant to permit term EG01,3.I

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Charge Handling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Refractory Burner #1
EU05
Process Description:
Refractory Burner #1
Control Device: **Melt Baghouse (CU01)** Note 4

Natural Gas Combustion

Inputs

8.5	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
8333.3	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
73	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	(tpy)	
PM/PM10/PM2.5	n/a	7.6	0.06	0.28	Note 5
NOx	n/a	100.0	0.83	3.65	
CO	n/a	84.0	0.70	3.07	
Lead	n/a	0.0005	4.17E-06	1.83E-05	
SO2	n/a	0.6	0.01	0.02	
VOC	n/a	5.5	0.05	0.20	
CO_2e	n/a	120,000	1000.00	4380.00	
Arsenic (As)	7440-38-2	2.00E-04	1.67E-06	7.30E-06	
Beryllium (Be)	7440-41-7	1.20E-05	1.00E-07	4.38E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	9.17E-06	4.02E-05	
Chromium (Cr)	7440-47-3	1.40E-03	1.17E-05	5.11E-05	
Cobalt (Co)	7440-48-4	8.40E-05	7.00E-07	3.07E-06	
Lead (Pb)	7439-92-1	5.00E-04	4.17E-06	1.83E-05	
Manganese (Mn)	7439-96-5	3.80E-04	3.17E-06	1.39E-05	
Mercury (Hg)	7439-97-6	2.60E-04	2.17E-06	9.49E-06	
Nickel (Ni)	7440-02-0	2.10E-03	1.75E-05	7.67E-05	
Selenium (Se)	7782-49-2	2.40E-05	2.00E-07	8.76E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	2.00E-07	8.76E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	1.50E-08	6.57E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	1.33E-07	5.84E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	2.00E-08	8.76E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Benzene	71-43-2	2.10E-03	1.75E-05	7.67E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	1.00E-08	4.38E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	1.00E-08	4.38E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	1.00E-08	4.38E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	1.00E-05	4.38E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	2.50E-08	1.10E-07	Note 3
Fluorene (POM)	86-73-7	2.80E-06	2.33E-08	1.02E-07	Note 3
Formaldehyde	50-00-0	7.50E-02	6.25E-04	2.74E-03	
Hexane	110-54-3	1.80E+00	1.50E-02	6.57E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	5.08E-06	2.23E-05	
Phenanathrene (POM)	85-01-8	1.70E-05	1.42E-07	6.21E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	4.17E-08	1.83E-07	Note 3
Toluene	108-88-3	3.40E-03	2.83E-05	1.24E-04	
Total POM			7.35E-07	3.22E-06	
Total HAPs			1.57E-02	6.89E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Provided at DAQ request; due to facility negative pressure, emissions are subsequently controlled by assigned APCD.

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Refractory Burner #2
EU06
Process Description:
Refractory Burner #2
Control Device: **Melt Baghouse (CU01)** Note 4

Natural Gas Combustion

Inputs

8.5	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
8333.3	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
73	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	(tpy)	
PM/PM10/PM2.5	n/a	7.6	0.06	0.28	Note 5
NOx	n/a	100.0	0.83	3.65	
CO	n/a	84.0	0.70	3.07	
Lead	n/a	0.0005	4.17E-06	1.83E-05	
SO2	n/a	0.6	0.01	0.02	
VOC	n/a	5.5	0.05	0.20	
CO_2e	n/a	120,000	1000.00	4380.00	
Arsenic (As)	7440-38-2	2.00E-04	1.67E-06	7.30E-06	
Beryllium (Be)	7440-41-7	1.20E-05	1.00E-07	4.38E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	9.17E-06	4.02E-05	
Chromium (Cr)	7440-47-3	1.40E-03	1.17E-05	5.11E-05	
Cobalt (Co)	7440-48-4	8.40E-05	7.00E-07	3.07E-06	
Lead (Pb)	7439-92-1	5.00E-04	4.17E-06	1.83E-05	
Manganese (Mn)	7439-96-5	3.80E-04	3.17E-06	1.39E-05	
Mercury (Hg)	7439-97-6	2.60E-04	2.17E-06	9.49E-06	
Nickel (Ni)	7440-02-0	2.10E-03	1.75E-05	7.67E-05	
Selenium (Se)	7782-49-2	2.40E-05	2.00E-07	8.76E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	2.00E-07	8.76E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	1.50E-08	6.57E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	1.33E-07	5.84E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	2.00E-08	8.76E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Benzene	71-43-2	2.10E-03	1.75E-05	7.67E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	1.00E-08	4.38E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	1.00E-08	4.38E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	1.00E-08	4.38E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	1.00E-05	4.38E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	2.50E-08	1.10E-07	Note 3
Fluorene (POM)	86-73-7	2.80E-06	2.33E-08	1.02E-07	Note 3
Formaldehyde	50-00-0	7.50E-02	6.25E-04	2.74E-03	
Hexane	110-54-3	1.80E+00	1.50E-02	6.57E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	1.50E-08	6.57E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	5.08E-06	2.23E-05	
Phenanathrene (POM)	85-01-8	1.70E-05	1.42E-07	6.21E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	4.17E-08	1.83E-07	Note 3
Toluene	108-88-3	3.40E-03	2.83E-05	1.24E-04	
Total POM			7.35E-07	3.22E-06	
Total HAPs			1.57E-02	6.89E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.l)
Note 5: Provided at DAQ request; due to facility negative pressure, emissions are subsequently controlled by assigned APCD.

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
22,897 Tons/Year

Flow Diagram Designation
Induction Furnace #1
EU07

Maximum Hourly Capacity
10.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Induction Furnace #1
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: 0.0020 gr/dscf
Airflow: 27,002 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.09	0.50		
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.533	0.533	0.533			0.930	5.000		
	Annual (TPY)	**2.336**	**2.336**	**2.336**			**1.065**	**5.724**		
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.533	0.533	0.533			0.930	5.000		
	Annual (TPY)	**2.336**	**2.336**	**2.336**			**1.065**	**5.724**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: March 2020 compliance test
Note 4: See below HAPs calculations
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
22,897 Tons/Year

Flow Diagram Designation
Induction Furnace #2
EU08

Maximum Hourly Capacity
10.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Induction Furnace #2
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: 0.0020 gr/dscf
Airflow: 27,002 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.09	0.50		
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.533	0.533	0.533			0.930	5.000		
	Annual (TPY)	**2.336**	**2.336**	**2.336**			**1.065**	**5.724**		
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.533	0.533	0.533			0.930	5.000		
	Annual (TPY)	**2.336**	**2.336**	**2.336**			**1.065**	**5.724**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: March 2020 compliance test
Note 4: See below HAPs calculations
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
22,897 Tons/Year

Flow Diagram Designation
Induction Furnace #3
EU09

Maximum Hourly Capacity
10.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Induction Furnace #3
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: 0.0020 gr/dscf
Airflow: 27,002 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #3									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.09	0.50		
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.533	0.533	0.533			0.930	5.000		
	Annual (TPY)	**2.336**	**2.336**	**2.336**			**1.065**	**5.724**		
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.533	0.533	0.533			0.930	5.000		
	Annual (TPY)	**2.336**	**2.336**	**2.336**			**1.065**	**5.724**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: March 2020 compliance test
Note 4: See below HAPs calculations
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #3

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
22,897 Tons/Year

Flow Diagram Designation
Induction Furnace #4
EU10

Maximum Hourly Capacity
10.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Induction Furnace #4
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: 0.0020 gr/dscf
Airflow: 27,002 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #4									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.09	0.50		
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.533	0.533	0.533			0.930	5.000		
	Annual (TPY)	**2.336**	**2.336**	**2.336**			**1.065**	**5.724**		
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.533	0.533	0.533			0.930	5.000		
	Annual (TPY)	**2.336**	**2.336**	**2.336**			**1.065**	**5.724**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: March 2020 compliance test
Note 4: See below HAPs calculations
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #4

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Hot Metal Transfer
EU13

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Hot Metal Transfer
Control Device: Melt Baghouse (CU01) Note 3
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:	**Criteria Pollutants**								
Hot Metal Transfer									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	0.056	0.052	0.046						
(source)	Note 1	Note 2	Note 2						
Capture Efficiency	100.00	100.00	100.00						
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
Annual (TPY)									
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Hot metal transfer at building monitor. AP-42, Ch. 12-5, Table 12.5-1
Note 2: Emission factor based on USEPA PM Calculator $PM/PM_{10}/PM_{2.5}$ ratio and uncontrolled PM emission factor for SCC 30400320
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Hot Metal Transfer

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Pouring Furnace #1
EU15
Process Description:
Pouring Furnace #1
Control Device: **Melt Baghouse (CU01)** Note 4

Natural Gas Combustion

Inputs

2.91	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
2852.9	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
24.99	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor (lb/10^6 scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.29	1.25	
CO	n/a	84.0	0.24	1.05	
Lead	n/a	0.0005	1.43E-06	6.25E-06	
SO2	n/a	0.6	0.00	0.01	
VOC	n/a	5.5	0.02	0.07	
CO_2e	n/a	120,000	342.35	1499.51	
Arsenic (As)	7440-38-2	2.00E-04	5.71E-07	2.50E-06	
Beryllium (Be)	7440-41-7	1.20E-05	3.42E-08	1.50E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	3.14E-06	1.37E-05	
Chromium (Cr)	7440-47-3	1.40E-03	3.99E-06	1.75E-05	
Cobalt (Co)	7440-48-4	8.40E-05	2.40E-07	1.05E-06	
Lead (Pb)	7439-92-1	5.00E-04	1.43E-06	6.25E-06	
Manganese (Mn)	7439-96-5	3.80E-04	1.08E-06	4.75E-06	
Mercury (Hg)	7439-97-6	2.60E-04	7.42E-07	3.25E-06	
Nickel (Ni)	7440-02-0	2.10E-03	5.99E-06	2.62E-05	
Selenium (Se)	7782-49-2	2.40E-05	6.85E-08	3.00E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	6.85E-08	3.00E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	5.14E-09	2.25E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	4.56E-08	2.00E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	6.85E-09	3.00E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Benzene	71-43-2	2.10E-03	5.99E-06	2.62E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	3.42E-09	1.50E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	3.42E-09	1.50E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	3.42E-09	1.50E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	3.42E-06	1.50E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	8.56E-09	3.75E-08	Note 3
Fluorene (POM)	86-73-7	2.80E-06	7.99E-09	3.50E-08	Note 3
Formaldehyde	50-00-0	7.50E-02	2.14E-04	9.37E-04	
Hexane	110-54-3	1.80E+00	5.14E-03	2.25E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	1.74E-06	7.62E-06	
Phenanathrene (POM)	85-01-8	1.70E-05	4.85E-08	2.12E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	1.43E-08	6.25E-08	Note 3
Toluene	108-88-3	3.40E-03	9.70E-06	4.25E-05	
Total POM			2.52E-07	1.10E-06	
Total HAPs			5.39E-03	2.36E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Pouring Furnace #2
EU16
Process Description:
Pouring Furnace #2
Control Device: **Melt Baghouse (CU01)** Note 4

Natural Gas Combustion

Inputs

2.91	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
2852.9	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
24.99	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.29	1.25	
CO	n/a	84.0	0.24	1.05	
Lead	n/a	0.0005	1.43E-06	6.25E-06	
SO2	n/a	0.6	0.00	0.01	
VOC	n/a	5.5	0.02	0.07	
CO_2e	n/a	120,000	342.35	1499.51	
Arsenic (As)	7440-38-2	2.00E-04	5.71E-07	2.50E-06	
Beryllium (Be)	7440-41-7	1.20E-05	3.42E-08	1.50E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	3.14E-06	1.37E-05	
Chromium (Cr)	7440-47-3	1.40E-03	3.99E-06	1.75E-05	
Cobalt (Co)	7440-48-4	8.40E-05	2.40E-07	1.05E-06	
Lead (Pb)	7439-92-1	5.00E-04	1.43E-06	6.25E-06	
Manganese (Mn)	7439-96-5	3.80E-04	1.08E-06	4.75E-06	
Mercury (Hg)	7439-97-6	2.60E-04	7.42E-07	3.25E-06	
Nickel (Ni)	7440-02-0	2.10E-03	5.99E-06	2.62E-05	
Selenium (Se)	7782-49-2	2.40E-05	6.85E-08	3.00E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	6.85E-08	3.00E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	5.14E-09	2.25E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	4.56E-08	2.00E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	6.85E-09	3.00E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Benzene	71-43-2	2.10E-03	5.99E-06	2.62E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	3.42E-09	1.50E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	3.42E-09	1.50E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	3.42E-09	1.50E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	3.42E-06	1.50E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	8.56E-09	3.75E-08	Note 3
Fluorene (POM)	86-73-7	2.80E-06	7.99E-09	3.50E-08	Note 3
Formaldehyde	50-00-0	7.50E-02	2.14E-04	9.37E-04	
Hexane	110-54-3	1.80E+00	5.14E-03	2.25E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	5.14E-09	2.25E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	1.74E-06	7.62E-06	
Phenanathrene (POM)	85-01-8	1.70E-05	4.85E-08	2.12E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	1.43E-08	6.25E-08	Note 3
Toluene	108-88-3	3.40E-03	9.70E-06	4.25E-05	
Total POM			2.52E-07	1.10E-06	
Total HAPs			5.39E-03	2.36E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Melt and Core/Mold Baghouse Dust Silo
EU17

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Melt and Core/Mold Baghouse Dust Silo
Control Device: Melt and Core/Mold BHs Dust Silo Bin Vent Filter (CU02)
SCC Code:
Control Device Outlet: 0.0030 gr/dscf
Airflow: 600 acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	Melt and Core/Mold Baghouse Dust Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.015	0.015	0.015						
	Annual (TPY)	**0.064**	**0.064**	**0.064**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.015	0.015	0.015						
	Annual (TPY)	**0.064**	**0.064**	**0.064**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Melt and Core/Mold Baghouse Dust Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Refractory Curing Mobile Burner
EU18
Process Description:
Refractory Curing Mobile Burner
Control Device: **Melt Baghouse (CU01)** Note 4

Natural Gas Combustion

Inputs

2.00	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
1960.8	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
17.18	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.20	0.86	
CO	n/a	84.0	0.16	0.72	
Lead	n/a	0.0005	9.80E-07	4.29E-06	
SO2	n/a	0.6	0.00	0.01	
VOC	n/a	5.5	0.01	0.05	
CO_2e	n/a	120,000	235.29	1030.59	
Arsenic (As)	7440-38-2	2.00E-04	3.92E-07	1.72E-06	
Beryllium (Be)	7440-41-7	1.20E-05	2.35E-08	1.03E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	2.16E-06	9.45E-06	
Chromium (Cr)	7440-47-3	1.40E-03	2.75E-06	1.20E-05	
Cobalt (Co)	7440-48-4	8.40E-05	1.65E-07	7.21E-07	
Lead (Pb)	7439-92-1	5.00E-04	9.80E-07	4.29E-06	
Manganese (Mn)	7439-96-5	3.80E-04	7.45E-07	3.26E-06	
Mercury (Hg)	7439-97-6	2.60E-04	5.10E-07	2.23E-06	
Nickel (Ni)	7440-02-0	2.10E-03	4.12E-06	1.80E-05	
Selenium (Se)	7782-49-2	2.40E-05	4.71E-08	2.06E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	4.71E-08	2.06E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	3.53E-09	1.55E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	3.14E-08	1.37E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	3.53E-09	1.55E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	3.53E-09	1.55E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	4.71E-09	2.06E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	3.53E-09	1.55E-08	Note 2,3
Benzene	71-43-2	2.10E-03	4.12E-06	1.80E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	2.35E-09	1.03E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	3.53E-09	1.55E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	2.35E-09	1.03E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	3.53E-09	1.55E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	3.53E-09	1.55E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	2.35E-09	1.03E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	2.35E-06	1.03E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	5.88E-09	2.58E-08	Note 3
Fluorene (POM)	86-73-7	2.80E-06	5.49E-09	2.40E-08	Note 3
Formaldehyde	50-00-0	7.50E-02	1.47E-04	6.44E-04	
Hexane	110-54-3	1.80E+00	3.53E-03	1.55E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	3.53E-09	1.55E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	1.20E-06	5.24E-06	
Phenanathrene (POM)	85-01-8	1.70E-05	3.33E-08	1.46E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	9.80E-09	4.29E-08	Note 3
Toluene	108-88-3	3.40E-03	6.67E-06	2.92E-05	
Total POM			1.73E-07	7.57E-07	
Total HAPs			3.70E-03	1.62E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Mold Silica Sand Silo
EU19

Maximum Hourly Capacity
25.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Mold Silica Sand Silo
Control Device: Mold Silica Sand Silo Bin Vent Filter (CU03)
SCC Code:
Control Device Outlet: 0.0030 gr/dscf
Airflow: 600 acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	Mold Silica Sand Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.015	0.015	0.015						
	Annual (TPY)	**0.001**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.015	0.015	0.015						
	Annual (TPY)	**0.001**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
1 HRS/DAY
125 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Silica Sand Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
4,179 Tons/Year

Flow Diagram Designation
Blend Silo
EU20

Maximum Hourly Capacity
25.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Blend Silo
Control Device: Blend Silo Bin Vent Filter (CU04)
SCC Code:
Control Device Outlet: 0.0030 gr/dscf
Airflow: 600 acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
Blend Silo										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.015	0.015	0.015						
Annual (TPY)		**0.001**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.015	0.015	0.015						
Annual (TPY)		**0.001**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
1 HRS/DAY
125 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Blend Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
595 Tons/Year

Flow Diagram Designation
Bentonite Silo
EU21

Maximum Hourly Capacity
25.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Bentonite Silo
Control Device: Bentonite Silo Bin Vent Filter (CU05)
SCC Code:
Control Device Outlet: 0.0030 gr/dscf
Airflow: 600 acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	Bentonite Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.015	0.015	0.015						
	Annual (TPY)	**0.001**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.015	0.015	0.015						
	Annual (TPY)	**0.001**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
1 HRS/DAY
125 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Bentonite Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
716,760 Tons/Year

Flow Diagram Designation
Mold Sand Handling and Preparation
EU22

Maximum Hourly Capacity
198.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Mold Sand Handling and Preparation
Control Device: Sand Plant Baghouse (CU06) Note 3
SCC Code:
Control Device Outlet: 0.0025 gr/dscf
Airflow: 84,821 acfm
Stack Gas Temperature: 100 °F

Facility Process Name:			**Criteria Pollutants**								
	Mold Sand Handling and Preparation										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	3.60	0.54	0.54						
(source)			Note 1	Note 1	Note 2						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		1.720	1.720	1.720						
	Annual (TPY)		**7.535**	**7.535**	**7.535**						
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		1.720	1.720	1.720						
	Annual (TPY)		**7.535**	**7.535**	**7.535**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-50
Note 2: Assumes PM2.5 is equal to PM10
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Sand Handling and Preparation

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Annual Actual Throughput
45,793 Tons/Year

Flow Diagram Designation
Mold Making #1
EU33

Hourly Actual Throughput
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Mold Making #1
Control Device: Core/Mold Baghouse (CU08) Note 3
SCC Code:
Control Device Outlet: 0.0020 gr/dscf
Airflow: 6,522 acfm
Stack Gas Temperature: °F

Facility Process Name:	**Criteria Pollutants**								
Mold Making #1									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	0.04	0.04	0.04						
(source)	Note 1	Note 2	Note 2			Note 4			
Capture Efficiency	100.00	100.00	100.00						
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.129	0.129	0.129						
Annual (TPY)	**0.564**	**0.564**	**0.564**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.129	0.129	0.129						
Annual (TPY)	**0.564**	**0.564**	**0.564**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio RACM, Table 2.7-1
Note 2: PM_{10} and $PM_{2.5}$ assumed equal to PM.
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 4: Emissions from mold release (Zip-Slip LR57HP) quantified with pouring, cooling and shakeout

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Making #1

100.00

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Annual Actual Throughput
45,793 Tons/Year

Flow Diagram Designation
Mold Making #2
EU34

Hourly Actual Throughput
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Mold Making #2
Control Device: Core/Mold Baghouse (CU08) Note 3
SCC Code:
Control Device Outlet: 0.0020 gr/dscf
Airflow: 6,522 acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Mold Making #2										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			0.04	0.04	0.04						
(source)			Note 1	Note 2	Note 2			Note 4			
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.129	0.129	0.129						
	Annual (TPY)		**0.564**	**0.564**	**0.564**						
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.129	0.129	0.129						
	Annual (TPY)		**0.564**	**0.564**	**0.564**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio RACM, Table 2.7-1
Note 2: PM_{10} and $PM_{2.5}$ assumed equal to PM.
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 4: Emissions from mold release (Zip-Slip LR57HP) quantified with pouring, cooling and shakeout

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Making #2

HAP Capture Efficiency: 100.00
Metal HAP Control Efficiency:

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
6,690 Tons/Year

Flow Diagram Designation
Core Silica Sand Silo A
EU35A

Maximum Hourly Capacity
25.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Core Silica Sand Silo A
Control Device: Core Silica Sand Silo A Bin Vent Filter (CU19)
SCC Code:
Control Device Outlet: 0.0030 gr/dscf
Airflow: 600 acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	Core Silica Sand Silo A									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.015	0.015	0.015						
	Annual (TPY)	**0.001**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.015	0.015	0.015						
	Annual (TPY)	**0.001**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
1 HRS/DAY
125 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Silica Sand Silo A

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
6,690 Tons/Year

Flow Diagram Designation
Core Silica Sand Silo B
EU35B

Maximum Hourly Capacity
25.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Core Silica Sand Silo B
Control Device: Core Silica Sand Silo B Bin Vent Filter (CU20)
SCC Code:
Control Device Outlet: 0.0030 gr/dscf
Airflow: 600 acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	Core Silica Sand Silo B									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.015	0.015	0.015						
Annual (TPY)		**0.001**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.015	0.015	0.015						
Annual (TPY)		**0.001**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
1 HRS/DAY
125 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-40
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Silica Sand Silo B

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
13,380 Tons/Year

Flow Diagram Designation
Core Sand Handling and Preparation
EU36

Maximum Hourly Capacity
3.70 Tons/Hour

Process Description:
Fritz Winter North America, LP
Core Sand Handling and Preparation

Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: 0.0020 gr/dscf
Airflow: 3,652 acfm
Stack Gas Temperature: 100 °F

Facility Process Name:			**Criteria Pollutants**								
	Core Sand Handling and Preparation										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.65	0.54	0.54						
(source)			Note 1	Note 2	Note 3						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.059	0.059	0.059						
	Annual (TPY)		**0.260**	**0.260**	**0.260**						
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.059	0.059	0.059						
	Annual (TPY)		**0.260**	**0.260**	**0.260**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AIRS Facility Subsystem SCC and EF Listing (EPA 450/4-90-003, March 1990)
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-50
Note 3: Assumes PM2.5 is equal to PM10

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Sand Handling and Preparation

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
3,345 Tons/Year

Flow Diagram Designation
PUCB Core Machine #1(Resin and Catalyst)
EU39

Maximum Hourly Sand Capacity
0.93 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #1(Resin and Catalyst)
Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: 0.0005 gr/dscf
Airflow: 3,750 acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #1(Resin and Catalyst)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton sand	0.65	0.65	0.65			1.066			
(source)		Note 1	Note 1	Note 1			Note 2			
	Capture Efficiency	100.00	100.00	100.00			100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.015	0.015	0.015			0.986			
	Annual (TPY)	**0.067**	**0.067**	**0.067**			**1.782**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.015	0.015	0.015			0.986			
	Annual (TPY)	**0.067**	**0.067**	**0.067**			**1.782**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 2: OCMA VOC Study (0.65 lb/ton sand); 1.25% resin (BOS); 10% catalyst (BOR); 98% scrubber efficiency for catalyst

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1(Resin and Catalyst)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	0.0034			3.15E-03	5.69E-03	**3.15E-03**	**5.69E-03**	Note 4
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0221			2.04E-02	3.70E-02	**2.04E-02**	**3.70E-02**	Note 4
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0138			1.28E-02	2.31E-02	**1.28E-02**	**2.31E-02**	Note 4
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
Total HAPs					3.64E-02	6.57E-02	3.64E-02	6.57E-02	

Note 4: CERP Report (Tecknikon #1409-123-EQ) December 2002, Table 3-2

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Core Release Capacity
7.7 Tons/Year

Flow Diagram Designation
PUCB Core Machine #1 (Core Release)
EU39

Maximum Hourly Core Release Capacity
0.0021 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #1 (Core Release)
Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #1 (Core Release)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton						1700.000			
(source)							Note 1,2			
	Capture Efficiency						100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ACMOS 118-63 Core Release (84% VOC by weight per SDS and 1/3/2022 email)
HA NIxStix CB/NB Fast Dry (85% VOC per J. Krause 1/3/2022 email)
Note 2: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1 (Core Release)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
3,345 Tons/Year

Flow Diagram Designation
PUCB Core Machine #2(Resin and Catalyst)
EU40

Maximum Hourly Sand Capacity
0.93 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #2(Resin and Catalyst)
Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: 0.0005 gr/dscf
Airflow: 3,750 acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #2(Resin and Catalyst)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton sand	0.65	0.65	0.65			1.066			
(source)		Note 1	Note 1	Note 1			Note 2			
	Capture Efficiency	100.00	100.00	100.00			100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.015	0.015	0.015			0.986			
	Annual (TPY)	**0.067**	**0.067**	**0.067**			**1.782**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.015	0.015	0.015			0.986			
	Annual (TPY)	**0.067**	**0.067**	**0.067**			**1.782**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 2: OCMA VOC Study (0.65 lb/ton sand); 1.25% resin (BOS); 10% catalyst (BOR); 98% scrubber efficiency for catalyst

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #2(Resin and Catalyst)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	0.0034			3.15E-03	5.69E-03	**3.15E-03**	**5.69E-03**	Note 4
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0221			2.04E-02	3.70E-02	**2.04E-02**	**3.70E-02**	Note 4
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0138			1.28E-02	2.31E-02	**1.28E-02**	**2.31E-02**	Note 4
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
Total HAPs					3.64E-02	6.57E-02	3.64E-02	6.57E-02	

Note 4: CERP Report (Tecknikon #1409-123-EQ) December 2002, Table 3-2

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
7.7 Tons/Year

Flow Diagram Designation
PUCB Core Machine #2 (Core Release)
EU40

Maximum Hourly Sand Capacity
0.0021 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #2 (Core Release)
Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #2 (Core Release)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton						1700.000			
(source)							Note 1,2			
	Capture Efficiency						100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ACMOS 118-63 Core Release (84% VOC by weight per SDS and 1/3/2022 email)
HA NIxStix CB/NB Fast Dry (85% VOC per J. Krause 1/3/2022 email)
Note 2: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #2 (Core Release)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
3,345 Tons/Year

Flow Diagram Designation
PUCB Core Machine #3(Resin and Catalyst)
EU41

Maximum Hourly Sand Capacity
0.93 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #3(Resin and Catalyst)
Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: 0.0005 gr/dscf
Airflow: 3,750 acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #3(Resin and Catalyst)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton sand	0.65	0.65	0.65			1.066			
(source)		Note 1	Note 1	Note 1			Note 2			
	Capture Efficiency	100.00	100.00	100.00			100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.015	0.015	0.015			0.986			
	Annual (TPY)	**0.067**	**0.067**	**0.067**			**1.782**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.015	0.015	0.015			0.986			
	Annual (TPY)	**0.067**	**0.067**	**0.067**			**1.782**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 2: OCMA VOC Study (0.65 lb/ton sand); 1.25% resin (BOS); 10% catalyst (BOR); 98% scrubber efficiency for catalyst

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #3(Resin and Catalyst)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	0.0034			3.15E-03	5.69E-03	**3.15E-03**	**5.69E-03**	Note 4
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0221			2.04E-02	3.70E-02	**2.04E-02**	**3.70E-02**	Note 4
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0138			1.28E-02	2.31E-02	**1.28E-02**	**2.31E-02**	Note 4
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
Total HAPs					3.64E-02	6.57E-02	3.64E-02	6.57E-02	

Note 4: CERP Report (Tecknikon #1409-123-EQ) December 2002, Table 3-2

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
7.7 Tons/Year

Flow Diagram Designation
PUCB Core Machine #3 (Core Release)
EU41

Maximum Hourly Sand Capacity
0.0021 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #3 (Core Release)
Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #3 (Core Release)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton						1700.000			
(source)							Note 1,2			
	Capture Efficiency						100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ACMOS 118-63 Core Release (84% VOC by weight per SDS and 1/3/2022 email)
HA NIxStix CB/NB Fast Dry (85% VOC per J. Krause 1/3/2022 email)
Note 2: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #3 (Core Release)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
3,345 Tons/Year

Flow Diagram Designation
PUCB Core Machine #4(Resin and Catalyst)
EU42

Maximum Hourly Sand Capacity
0.93 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #4(Resin and Catalyst)
Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: 0.0005 gr/dscf
Airflow: 3,750 acfm
Stack Gas Temperature: 100 °F

Facility Process Name:			**Criteria Pollutants**								
	PUCB Core Machine #4(Resin and Catalyst)										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton sand	0.65	0.65	0.65			1.066			
(source)			Note 1	Note 1	Note 1			Note 2			
		Capture Efficiency	100.00	100.00	100.00			100.00			
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.015	0.015	0.015			0.986			
	Annual (TPY)		**0.067**	**0.067**	**0.067**			**1.782**			
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.015	0.015	0.015			0.986			
	Annual (TPY)		**0.067**	**0.067**	**0.067**			**1.782**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 2: OCMA VOC Study (0.65 lb/ton sand); 1.25% resin (BOS); 10% catalyst (BOR); 98% scrubber efficiency for catalyst

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #4(Resin and Catalyst)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	0.0034			3.15E-03	5.69E-03	**3.15E-03**	**5.69E-03**	Note 4
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0221			2.04E-02	3.70E-02	**2.04E-02**	**3.70E-02**	Note 4
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0138			1.28E-02	2.31E-02	**1.28E-02**	**2.31E-02**	Note 4
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
Total HAPs					3.64E-02	6.57E-02	3.64E-02	6.57E-02	

Note 4: CERP Report (Tecknikon #1409-123-EQ) December 2002, Table 3-2

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
7.7 Tons/Year

Flow Diagram Designation
PUCB Core Machine #4 (Core Release)
EU42

Maximum Hourly Sand Capacity
0.0021 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #4 (Core Release)
Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 100 °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #4 (Core Release)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton						1700.000			
(source)							Note 1,2			
	Capture Efficiency						100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ACMOS 118-63 Core Release (84% VOC by weight per SDS and 1/3/2022 email)
HA NIxStix CB/NB Fast Dry (85% VOC per J. Krause 1/3/2022 email)
Note 2: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #4 (Core Release)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
135.0 Tons/Year Note 1

Flow Diagram Designation
Core Wash Station #1
EU43

Maximum Hourly Sand Capacity
0.338 Tons/Hour Note 1

Process Description:
Fritz Winter North America, LP
Core Wash Station #1
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: 0.0020 gr/dscf
Airflow: 652 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Core Wash Station #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						0.76%			
(source)							Note 2			
Capture Efficiency		100.000	100.000	100.000						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.013	0.013	0.013			5.130			
Annual (TPY)		**0.056**	**0.056**	**0.056**			**1.026**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.013	0.013	0.013			5.130			
Annual (TPY)		**0.056**	**0.056**	**0.056**			**1.026**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Usage from original permit application
Note 2: VOC Content from original permit application; ASK rep indicated less than 0.1% VOC

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Wash Station #1

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Core Dryer #1
EU44
Process Description:
Core Dryer #1
Control Device: **Core/Mold Baghouse (CU08)** Note 4

Natural Gas Combustion

Inputs

4.0	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
3921.6	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
34.35294118	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.392	1.718	
CO	n/a	84.0	0.329	1.443	
Lead	n/a	0.0005	1.96E-06	8.59E-06	
SO2	n/a	0.6	0.002	0.010	
VOC	n/a	5.5	0.022	0.094	
CO_2e	n/a	120,000	470.588	2061.176	
Arsenic (As)	7440-38-2	2.00E-04	7.84E-07	3.44E-06	
Beryllium (Be)	7440-41-7	1.20E-05	4.71E-08	2.06E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	4.31E-06	1.89E-05	
Chromium (Cr)	7440-47-3	1.40E-03	5.49E-06	2.40E-05	
Cobalt (Co)	7440-48-4	8.40E-05	3.29E-07	1.44E-06	
Lead (Pb)	7439-92-1	5.00E-04	1.96E-06	8.59E-06	
Manganese (Mn)	7439-96-5	3.80E-04	1.49E-06	6.53E-06	
Mercury (Hg)	7439-97-6	2.60E-04	1.02E-06	4.47E-06	
Nickel (Ni)	7440-02-0	2.10E-03	8.24E-06	3.61E-05	
Selenium (Se)	7782-49-2	2.40E-05	9.41E-08	4.12E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	9.41E-08	4.12E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	6.27E-08	2.75E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	9.41E-09	4.12E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzene	71-43-2	2.10E-03	8.24E-06	3.61E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	4.71E-06	2.06E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	1.18E-08	5.15E-08	Note 3
Fluorene (POM)	86-73-7	2.80E-06	1.10E-08	4.81E-08	Note 3
Formaldehyde	50-00-0	7.50E-02	2.94E-04	1.29E-03	
Hexane	110-54-3	1.80E+00	7.06E-03	3.09E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	2.39E-06	1.05E-05	
Phenanathrene (POM)	85-01-8	1.70E-05	6.67E-08	2.92E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	1.96E-08	8.59E-08	Note 3
Toluene	108-88-3	3.40E-03	1.33E-05	5.84E-05	
Total POM			3.46E-07	1.51E-06	
Total HAPs			7.41E-03	3.24E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Core Dryer #2
EU45
Process Description:
Core Dryer #2
Control Device: **Core/Mold Baghouse (CU08)** Note 4

Natural Gas Combustion

Inputs

4.0	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
3921.6	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
34.35294118	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.392	1.718	
CO	n/a	84.0	0.329	1.443	
Lead	n/a	0.0005	1.96E-06	8.59E-06	
SO2	n/a	0.6	0.002	0.010	
VOC	n/a	5.5	0.022	0.094	
CO_2e	n/a	120,000	470.588	2061.176	
Arsenic (As)	7440-38-2	2.00E-04	7.84E-07	3.44E-06	
Beryllium (Be)	7440-41-7	1.20E-05	4.71E-08	2.06E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	4.31E-06	1.89E-05	
Chromium (Cr)	7440-47-3	1.40E-03	5.49E-06	2.40E-05	
Cobalt (Co)	7440-48-4	8.40E-05	3.29E-07	1.44E-06	
Lead (Pb)	7439-92-1	5.00E-04	1.96E-06	8.59E-06	
Manganese (Mn)	7439-96-5	3.80E-04	1.49E-06	6.53E-06	
Mercury (Hg)	7439-97-6	2.60E-04	1.02E-06	4.47E-06	
Nickel (Ni)	7440-02-0	2.10E-03	8.24E-06	3.61E-05	
Selenium (Se)	7782-49-2	2.40E-05	9.41E-08	4.12E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	9.41E-08	4.12E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	6.27E-08	2.75E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	9.41E-09	4.12E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzene	71-43-2	2.10E-03	8.24E-06	3.61E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	4.71E-06	2.06E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	1.18E-08	5.15E-08	Note 3
Fluorene (POM)	86-73-7	2.80E-06	1.10E-08	4.81E-08	Note 3
Formaldehyde	50-00-0	7.50E-02	2.94E-04	1.29E-03	
Hexane	110-54-3	1.80E+00	7.06E-03	3.09E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	2.39E-06	1.05E-05	
Phenanathrene (POM)	85-01-8	1.70E-05	6.67E-08	2.92E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	1.96E-08	8.59E-08	Note 3
Toluene	108-88-3	3.40E-03	1.33E-05	5.84E-05	
Total POM			3.46E-07	1.51E-06	
Total HAPs			7.41E-03	3.24E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Core Dryer #3
EU46
Process Description:
Core Dryer #3
Control Device: **Core/Mold Baghouse (CU08)** Note 4

Natural Gas Combustion

Inputs

4.0	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
3921.6	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
34.35294118	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.392	1.718	
CO	n/a	84.0	0.329	1.443	
Lead	n/a	0.0005	1.96E-06	8.59E-06	
SO2	n/a	0.6	0.002	0.010	
VOC	n/a	5.5	0.022	0.094	
CO_2e	n/a	120,000	470.588	2061.176	
Arsenic (As)	7440-38-2	2.00E-04	7.84E-07	3.44E-06	
Beryllium (Be)	7440-41-7	1.20E-05	4.71E-08	2.06E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	4.31E-06	1.89E-05	
Chromium (Cr)	7440-47-3	1.40E-03	5.49E-06	2.40E-05	
Cobalt (Co)	7440-48-4	8.40E-05	3.29E-07	1.44E-06	
Lead (Pb)	7439-92-1	5.00E-04	1.96E-06	8.59E-06	
Manganese (Mn)	7439-96-5	3.80E-04	1.49E-06	6.53E-06	
Mercury (Hg)	7439-97-6	2.60E-04	1.02E-06	4.47E-06	
Nickel (Ni)	7440-02-0	2.10E-03	8.24E-06	3.61E-05	
Selenium (Se)	7782-49-2	2.40E-05	9.41E-08	4.12E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	9.41E-08	4.12E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	6.27E-08	2.75E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	9.41E-09	4.12E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzene	71-43-2	2.10E-03	8.24E-06	3.61E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	4.71E-06	2.06E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	1.18E-08	5.15E-08	Note 3
Fluorene (POM)	86-73-7	2.80E-06	1.10E-08	4.81E-08	Note 3
Formaldehyde	50-00-0	7.50E-02	2.94E-04	1.29E-03	
Hexane	110-54-3	1.80E+00	7.06E-03	3.09E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	2.39E-06	1.05E-05	
Phenanathrene (POM)	85-01-8	1.70E-05	6.67E-08	2.92E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	1.96E-08	8.59E-08	Note 3
Toluene	108-88-3	3.40E-03	1.33E-05	5.84E-05	
Total POM			3.46E-07	1.51E-06	
Total HAPs			7.41E-03	3.24E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Core Dryer #4
EU47
Process Description:
Core Dryer #4
Control Device: **Core/Mold Baghouse (CU08)** Note 4

Natural Gas Combustion

Inputs

4.0	= Max. Hourly Heat Input Rate (MMBtu/hr)
1020	= MMBtu/MMscf
3921.6	= Max. Hourly Fuel Usage Rate (standard cubic feet hour)
8760	= Maximum Operation (hours/year)
34.35294118	= Maximum Annual Fuel Usage (MMscf)

POLLUTANT	CAS #	Note 1 Emission Factor ($lb/10^6$ scf)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	7.6			Note 5
NOx	n/a	100.0	0.392	1.718	
CO	n/a	84.0	0.329	1.443	
Lead	n/a	0.0005	1.96E-06	8.59E-06	
SO2	n/a	0.6	0.002	0.010	
VOC	n/a	5.5	0.022	0.094	
CO_2e	n/a	120,000	470.588	2061.176	
Arsenic (As)	7440-38-2	2.00E-04	7.84E-07	3.44E-06	
Beryllium (Be)	7440-41-7	1.20E-05	4.71E-08	2.06E-07	Note 2
Cadmium (Cd)	7440-43-9	1.10E-03	4.31E-06	1.89E-05	
Chromium (Cr)	7440-47-3	1.40E-03	5.49E-06	2.40E-05	
Cobalt (Co)	7440-48-4	8.40E-05	3.29E-07	1.44E-06	
Lead (Pb)	7439-92-1	5.00E-04	1.96E-06	8.59E-06	
Manganese (Mn)	7439-96-5	3.80E-04	1.49E-06	6.53E-06	
Mercury (Hg)	7439-97-6	2.60E-04	1.02E-06	4.47E-06	
Nickel (Ni)	7440-02-0	2.10E-03	8.24E-06	3.61E-05	
Selenium (Se)	7782-49-2	2.40E-05	9.41E-08	4.12E-07	
2-Methylnaphthalene (POM)	91-57-6	2.40E-05	9.41E-08	4.12E-07	Note 3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05	6.27E-08	2.75E-07	Note 2,3
Acenaphthene	83-32-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Acenaphthylene	208-96-8	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Anthracene	120-12-7	2.40E-06	9.41E-09	4.12E-08	Note 2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzene	71-43-2	2.10E-03	8.24E-06	3.61E-05	
Benzo(a)pyrene (POM)	50-32-8	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Chrysene (POM)	218-01-9	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06	4.71E-09	2.06E-08	Note 2,3
Dichlorobenzene	25321-22-6	1.20E-03	4.71E-06	2.06E-05	
Fluoranthene (POM)	206-44-0	3.00E-06	1.18E-08	5.15E-08	Note 3
Fluorene (POM)	86-73-7	2.80E-06	1.10E-08	4.81E-08	Note 3
Formaldehyde	50-00-0	7.50E-02	2.94E-04	1.29E-03	
Hexane	110-54-3	1.80E+00	7.06E-03	3.09E-02	
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06	7.06E-09	3.09E-08	Note 2,3
Naphthalene	91-20-3	6.10E-04	2.39E-06	1.05E-05	
Phenanathrene (POM)	85-01-8	1.70E-05	6.67E-08	2.92E-07	Note 3
Pyrene (POM)	129-00-0	5.00E-06	1.96E-08	8.59E-08	Note 3
Toluene	108-88-3	3.40E-03	1.33E-05	5.84E-05	
Total POM			3.46E-07	1.51E-06	
Total HAPs			7.41E-03	3.24E-02	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Pouring #1
EU50

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Pouring #1
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: 0.0020 gr/dscf gr/dscf
Airflow: 6,521 acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Pouring #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.410	0.410	0.336	0.020	0.010	0.500	5.000	4.79E-04	
(source)			Note 1	Note 1	Note 5	Note 2	Note 2	Note 4	Note 4	Note 3	
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.129	0.129	0.129	0.253	0.127	6.325	63.250	6.06E-03	
	Annual (TPY)		**0.564**	**0.564**	**0.564**	**0.458**	**0.229**	**11.448**	**114.483**	**1.10E-02**	
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.129	0.129	0.129	0.253	0.127	6.325	63.250	6.06E-03	
	Annual (TPY)		**0.564**	**0.564**	**0.564**	**0.458**	**0.229**	**11.448**	**114.483**	**1.10E-02**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Stack test at Quality Castings, Orrville, OH.
Note 2: WebFIRE (Aug 20, 2021) SCC 30400320
Note 3: Emission factors taken from the document entitled "Foundry Process Emission Factors: Baseline Emissions from Automotive Foundries in Mexico"; (CERP-Mexico); Table 5.12
Note 4: FWNA Original Application/BACT, using Waupaca RBLC entries and air volumes
Note 5: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb /
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (
Maximum Stack Emissions Rate (lb/hr) {SOx,NOx, VOC, CO} =(Max. Rated Capa
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of op
Maximum Annual (ton/yr) SOx NOx, VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Pouring #2
EU51

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Pouring #2
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: 0.0020 gr/dscf gr/dscf
Airflow: 6,521 acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Pouring #2										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.410	0.410	0.336	0.020	0.010	0.500	5.000	4.79E-04	
(source)			Note 1	Note 1	Note 4	Note 2	Note 2	Note 4	Note 4	Note 3	
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.129	0.129	0.129	0.253	0.127	6.325	63.250	6.06E-03	
	Annual (TPY)		**0.564**	**0.564**	**0.564**	**0.458**	**0.229**	**11.448**	**114.483**	**1.10E-02**	
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.129	0.129	0.129	0.253	0.127	6.325	63.250	6.06E-03	
	Annual (TPY)		**0.564**	**0.564**	**0.564**	**0.458**	**0.229**	**11.448**	**114.483**	**1.10E-02**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Stack test at Quality Castings, Orrville, OH.
Note 2: WebFIRE (Aug 20, 2021) SCC 30400320
Note 3: Emission factors taken from the document entitled "Foundry Process Emission Factors: Baseline Emissions from Automotive Foundries in Mexico"; (CERP-Mexico); Table 5.12
Note 4: FWNA Original Application/BACT, using Waupaca RBLC entries and air volumes
Note 5: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb /
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (
Maximum Stack Emissions Rate (lb/hr) {SOx,NOx, VOC, CO} =(Max. Rated Capa
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of op
Maximum Annual (ton/yr) SOx NOx, VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Mold Cooling
EU52

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Mold Cooling
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: 0.0020 gr/dscf gr/dscf
Airflow: 40,418 acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Mold Cooling										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton									
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.798	0.798	0.798						
	Annual (TPY)		**3.497**	**3.497**	**3.497**						
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.798	0.798	0.798						
	Annual (TPY)		**3.497**	**3.497**	**3.497**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emissions are combined with pouring. See Pouring #1 (EU50) or Pouring #2 (EU51) worksheets.

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb /
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (
Maximum Stack Emissions Rate (lb/hr) {SOx,NOx, VOC, CO} =(Max. Rated Capa
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of op
Maximum Annual (ton/yr) SOx NOx, VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Cooling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Shakeout Conveyor
EU53

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Shakeout Conveyor

Control Device:	Sand Plant Baghouse (CU06)	
SCC Code:		
Control Device Outlet:	0.0025 gr/dscf	gr/dscf
Airflow:	20,179 acfm	acfm
Stack Gas Temperature:	°F	

Facility Process Name:			**Criteria Pollutants**								
	Shakeout Conveyor										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	3.20	2.24	1.34			0.528	1.000		
(source)			Note 1	Note 1	Note 1			Note 2	Note 2		
		Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.498	0.498	0.498			13.358	25.300		
	Annual (TPY)		**2.182**	**2.182**	**2.182**			**24.179**	**45.793**		
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.498	0.498	0.498			13.358	25.300		
	Annual (TPY)		**2.182**	**2.182**	**2.182**			**24.179**	**45.793**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: WebFire SCC 30400318 (4/15/2021)
Note 2: RBLC ID: WI-0429, East Jordan Foundry LLC, Permit Number 185-16, Permit date 04/27/2017
Note 3: RBLC ID: WI-0256, Waupaca Plant #2/#3, Permit Number 13-JJW-103, Permit date 12/18/2013

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Shakeout Conveyor

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Pouring Cooling Shakeout HAPs (Mold)
HAPs

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Pouring Cooling Shakeout HAPs (Mold)
Control Device: CU06 and CU08
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Pouring Cooling Shakeout HAPs (Mold)										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton									
(source)			Note 1,2								
		Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: See below for organic HAP emissions from pouring, cooling and shakeout
Note 2: Inorganic HAPs are quantified on the air pollution control device worksheet for CU06 and CU08

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring Cooling Shakeout HAPs (Mold)

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0	0.0045			0.1137	0.2057	0.1137	0.2057	Note 3
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								Note 3
Anthracene	120-12-7								
Benzene	71-43-2	0.0728			1.8415	3.3331	1.8415	3.3331	Note 3
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.0050			0.1261	0.2282	0.1261	0.2282	Note 3
Formaldehyde	50-00-0								Note 3
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								Note 3
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.0411			1.0396	1.8816	1.0396	1.8816	Note 3
Xylenes	1330-20-7	0.0303			0.7668	1.3879	0.7668	1.3879	Note 3,4
	Total HAPs	0.1537			3.8876	7.0365	3.8876	7.0365	

Note 3: CERP/Technikon Report 1256-1311DQ for organic HAPs associated with green sand mold, Table 3-1
6 mold average adjusted for LOI (4.06 FWNA; 4.97 DQ Test)
Note 4: Xylene CAS number is used for mixture of isomers

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
108 Tons/Year

Flow Diagram Designation
Pouring Cooling Shakeout HAPs (Core)
HAPs

Maximum Hourly Capacity
0.03 Tons/Hour

Process Description:
Fritz Winter North America, LP
Pouring Cooling Shakeout HAPs (Core)
Control Device: CU06 and CU08
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Pouring Cooling Shakeout HAPs (Core)										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/lb									
(source)			Note 1,2								
		Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: See below for organic HAP emissions from pouring, cooling and shakeout attributed to core
Note 2: Inorganic HAPs are quantified on the air pollution control device worksheet for CU06 and CU08

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring Cooling Shakeout HAPs (Core)

HAPs	CAS No.	Emission Factor ton/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2	0.0084			0.5049	0.9129	0.5049	0.9129	Note 3
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.0001			0.0036	0.0065	0.0036	0.0065	
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0022			0.1340	0.2423	0.1340	0.2423	Note 3
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0189			1.1294	2.0421	1.1294	2.0421	Note 3
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.0012			0.0706	0.1276	0.0706	0.1276	Note 3
Xylenes	1330-20-7	0.0003			0.0203	0.0368	0.0203	0.0368	Note 3
	Total HAPs	0.0311			1.8628	3.3681	1.8628	3.3681	

Note 3: Supplier emissions incormation for PUCB ASK Focus I/II

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Sand Plant Waste Sand Silo
EU57

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Sand Plant Waste Sand Silo
Control Device: Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)
SCC Code:
Control Device Outlet: 0.0030 gr/dscf
Airflow: 600 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Sand Plant Waste Sand Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.018	0.018	0.018						
	Annual (TPY)	**0.078**	**0.078**	**0.078**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.018	0.018	0.018						
	Annual (TPY)	**0.078**	**0.078**	**0.078**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Sand Plant Waste Sand Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Casting Cooling
EU59

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Casting Cooling
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: 0.0020 gr/dscf
Airflow: 34,693 acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Casting Cooling										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.03	0.02	0.01						
(source)			Note 1	Note 1	Note 1						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.685	0.685	0.685						
	Annual (TPY)		**3.001**	**3.001**	**3.001**						
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.685	0.685	0.685						
	Annual (TPY)		**3.001**	**3.001**	**3.001**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: 1.0% of emission factor from FIRE 6.25 SCC 3-04-003-31

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Casting Cooling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Sorting Conveyor
EU60

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Sorting Conveyor

Control Device:	Fettling Baghouse (CU11)	
SCC Code:		
Control Device Outlet:	0.0010 gr/dscf	gr/dscf
Airflow:	17,727 acfm	acfm
Stack Gas Temperature:	°F	

Facility Process Name:			**Criteria Pollutants**								
	Sorting Conveyor										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.02	0.01	0.01						
(source)			Note 1	Note 1	Note 1						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.175	0.175	0.175						
	Annual (TPY)		**0.767**	**0.767**	**0.767**						
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.175	0.175	0.175						
	Annual (TPY)		**0.767**	**0.767**	**0.767**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: 0.5% of emission factor from FIRE 6.25 SCC 3-04-003-31

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Sorting Conveyor

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Steel Shot Blasting #1
EU61

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Steel Shot Blasting #1
Control Device: Fettling Baghouse (CU11)
SCC Code:
Control Device Outlet: 0.0010 gr/dscf
Airflow: 17,727 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Steel Shot Blasting #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	15.50	1.70	1.70						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.175	0.175	0.175						
	Annual (TPY)	**0.767**	**0.767**	**0.767**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.175	0.175	0.175						
	Annual (TPY)	**0.767**	**0.767**	**0.767**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-40
Note 3: Assumes $PM^{2.5}$ is equal to PM_{10}

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Steel Shot Blasting #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Steel Shot Blasting #2
EU62

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Steel Shot Blasting #2
Control Device: Fettling Baghouse (CU11)
SCC Code:
Control Device Outlet: 0.0010 gr/dscf
Airflow: 17,727 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Steel Shot Blasting #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.00	0.00						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.175	0.175	0.175						
	Annual (TPY)	**0.767**	**0.767**	**0.767**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.175	0.175	0.175						
	Annual (TPY)	**0.767**	**0.767**	**0.767**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-40
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Steel Shot Blasting #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
91,586 Tons/Year

Flow Diagram Designation
Fettling Baghouse Waste Dust Silo
EU63

Maximum Hourly Capacity
25.30 Tons/Hour

Process Description:
Fritz Winter North America, LP
Fettling Baghouse Waste Dust Silo
Control Device: Fettling BH Waste Dust Silo Bin Vent Filter (CU12)
SCC Code:
Control Device Outlet: 0.0030 gr/dscf
Airflow: 600 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Fettling Baghouse Waste Dust Silo										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.018	0.018	0.018						
Annual (TPY)		**0.078**	**0.078**	**0.078**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.018	0.018	0.018						
Annual (TPY)		**0.078**	**0.078**	**0.078**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Fettling Baghouse Waste Dust Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Auto Grinding #1
EU64

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Auto Grinding #1
Control Device: Fettling Baghouse (CU11)
SCC Code:
Control Device Outlet: 0.0010 gr/dscf
Airflow: 5,909 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Auto Grinding #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.005	0.005						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.058	0.058	0.058						
Annual (TPY)		**0.256**	**0.256**	**0.256**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.058	0.058	0.058						
Annual (TPY)		**0.256**	**0.256**	**0.256**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Auto Grinding #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Auto Grinding #2
EU65

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Auto Grinding #2
Control Device: Fettling Baghouse (CU11)
SCC Code:
Control Device Outlet: 0.0010 gr/dscf
Airflow: 5,909 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Auto Grinding #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.005	0.005						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.058	0.058	0.058						
Annual (TPY)		**0.256**	**0.256**	**0.256**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.058	0.058	0.058						
Annual (TPY)		**0.256**	**0.256**	**0.256**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Auto Grinding #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Machining Lines (9)
EU66

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Machining Lines (9)
Control Device: Machining Cartridge Collectors (CU13a-h)
SCC Code:
Control Device Outlet: 0.0010 gr/dscf
Airflow: 11,768 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Machining Lines (9)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.005	0.005						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.116	0.116	0.116						
	Annual (TPY)	**0.509**	**0.509**	**0.509**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.116	0.116	0.116						
	Annual (TPY)	**0.509**	**0.509**	**0.509**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Machining Lines (9)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Perforation Line #2
EU67

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Perforation Line #2
Control Device: Machining Cartridge Collectors (CU13i-j)
SCC Code:
Control Device Outlet: 0.0010 gr/dscf
Airflow: 11,768 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Perforation Line #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.005	0.005						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.116	0.116	0.116						
Annual (TPY)		**0.509**	**0.509**	**0.509**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.116	0.116	0.116						
Annual (TPY)		**0.509**	**0.509**	**0.509**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Perforation Line #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
25.19 Tons/Year

Flow Diagram Designation
Paint Line #3 (Coating)
EU68

Maximum Hourly Capacity
5.75 Lbs/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #3 (Coating)
Control Device: Paint Line #3 Booth Filter (CU14)
SCC Code:
Control Device Outlet: 0.0010 gr/dscf
Airflow: 2,750 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #3 (Coating)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.87	0.87	0.87			0.13			
(source)		Note 1	Note 2	Note 2			Note 1			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency		99.00	99.00	99.00						
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.027	0.027	0.027			0.748			
Annual (TPY)		**0.119**	**0.119**	**0.119**			**3.274**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.027	0.027	0.027			0.748			
Annual (TPY)		**0.119**	**0.119**	**0.119**			**3.274**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Zinc Dust Primer EDS (INMOTIQ Primer SB 1K) (density is 25.75 lb/gal)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #3 (Coating)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2	0.01%			5.75E-04	2.52E-03	**5.75E-04**	**2.52E-03**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8	0.06%			3.45E-03	1.51E-02	**3.45E-03**	**1.51E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.95%			5.46E-02	2.39E-01	**5.46E-02**	**2.39E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.02%			1.15E-03	5.04E-03	**1.15E-03**	**5.04E-03**	Note 1
Xylenes	1330-20-7	3.89%			2.24E-01	9.80E-01	**2.24E-01**	**9.80E-01**	Note 1
	Total HAPs				2.83E-01	1.24E+00	2.83E-01	1.24E+00	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #3 (Coating)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene	95-63-6	1.81%			4.92E-04	2.15E-03	**4.92E-04**	**2.15E-03**	Note 1
Zinc	7440-66-6	77.60%			2.11E-02	9.23E-02	**2.11E-02**	**9.23E-02**	Note 1
Zinc Oxide	1314-13-2	2.40%			6.52E-04	2.85E-03	**6.52E-04**	**2.85E-03**	Note 1

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
6.44 Tons/Year

Flow Diagram Designation
Paint Line #3 (Thinner)
EU68

Maximum Hourly Capacity
1.47 Lbs/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #3 (Thinner)
Control Device: Paint Line #3 Booth Filter (CU14)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #3 (Thinner)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb						1.00			
(source)							Note 1			
Capture Efficiency							100.00			
Control Efficiency										
Transfer Efficiency										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							1.470			
Annual (TPY)							**6.439**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							1.470			
Annual (TPY)							**6.439**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Reducing Solvent Blend for WG102992 TDS (Thinner Density is 7.26 lb/gal)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #3 (Thinner)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8	0.54%			7.89E-03	3.45E-02	**7.89E-03**	**3.45E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	3.30%			4.85E-02	2.13E-01	**4.85E-02**	**2.13E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7	6.19%			9.10E-02	3.99E-01	**9.10E-02**	**3.99E-01**	Note 1
	Total HAPs	10.03%			**1.47E-01**	**6.46E-01**	**1.47E-01**	**6.46E-01**	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #3 (Thinner)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
n-Butyl Acetate	123-86-4	51.59%			7.58E-01	3.32E+00	**7.58E-01**	**3.32E+00**	Note 1
solvent naphtha	64742-95-6	14.44%			2.12E-01	9.30E-01	**2.12E-01**	**9.30E-01**	Note 1
1,2,4-Trimethylbenzene	95-63-6	14.44%			2.12E-01	9.30E-01	**2.12E-01**	**9.30E-01**	Note 1
Butan-1-ol	71-36-3	6.19%			9.10E-02	3.99E-01	**9.10E-02**	**3.99E-01**	Note 1
Mesitylene	108-67-8	3.30%			4.85E-02	2.13E-01	**4.85E-02**	**2.13E-01**	Note 1

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
25.19 Tons/Year

Flow Diagram Designation
Paint Line #2(Coating)
EU69

Maximum Hourly Capacity
5.75 Lbs/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #2(Coating)
Control Device: Paint Line #2 Booth Filter (CU15)
SCC Code:
Control Device Outlet: 0.0010 gr/dscf
Airflow: 2,750 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #2(Coating)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.87	0.87	0.87			0.13			
(source)		Note 1	Note 2	Note 2			Note 1			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency		99.50	99.50	99.50						
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.027	0.027	0.027			0.748			
Annual (TPY)		**0.119**	**0.119**	**0.119**			**3.274**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.027	0.027	0.027			0.748			
Annual (TPY)		**0.119**	**0.119**	**0.119**			**3.274**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Zinc Dust Primer EDS (INMOTIQ Primer SB 1K) (density is 25.75 lb/gal)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #2(Coating)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2	0.01%			5.75E-04	2.52E-03	**5.75E-04**	**2.52E-03**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8	0.06%			3.45E-03	1.51E-02	**3.45E-03**	**1.51E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.95%			5.46E-02	2.39E-01	**5.46E-02**	**2.39E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.02%			1.15E-03	5.04E-03	**1.15E-03**	**5.04E-03**	Note 1
Xylenes	1330-20-7	3.89%			2.24E-01	9.80E-01	**2.24E-01**	**9.80E-01**	Note 1
	Total HAPs				2.83E-01	1.24E+00	2.83E-01	1.24E+00	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #2(Coating)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene	95-63-6	1.81%			4.92E-04	2.15E-03	**4.92E-04**	**2.15E-03**	Note 1
Zinc	7440-66-6	77.60%			2.11E-02	9.23E-02	**2.11E-02**	**9.23E-02**	Note 1
Zinc Oxide	1314-13-2	2.40%			6.52E-04	2.85E-03	**6.52E-04**	**2.85E-03**	Note 1

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
6.44 Tons/Year

Flow Diagram Designation
Paint Line #2(Thinner)
EU69

Maximum Hourly Capacity
1.47 Lbs/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #2(Thinner)
Control Device: Paint Line #2 Booth Filter (CU15)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #2(Thinner)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb						1.00			
(source)							Note 1			
Capture Efficiency							100.00			
Control Efficiency										
Transfer Efficiency										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							1.470			
Annual (TPY)							**6.439**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							1.470			
Annual (TPY)							**6.439**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Reducing Solvent Blend for WG102992 TDS (Thinner Density is 7.26 lb/gal)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #2(Thinner)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8	0.54%			7.89E-03	3.45E-02	**7.89E-03**	**3.45E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	3.30%			4.85E-02	2.13E-01	**4.85E-02**	**2.13E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7	6.19%			9.10E-02	3.99E-01	**9.10E-02**	**3.99E-01**	Note 1
	Total HAPs	10.03%			**1.47E-01**	**6.46E-01**	**1.47E-01**	**6.46E-01**	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #2(Thinner)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
n-Butyl Acetate	123-86-4	51.59%			7.58E-01	3.32E+00	**7.58E-01**	**3.32E+00**	Note 1
solvent naphtha	64742-95-6	14.44%			2.12E-01	9.30E-01	**2.12E-01**	**9.30E-01**	Note 1
1,2,4-Trimethylbenzene	95-63-6	14.44%			2.12E-01	9.30E-01	**2.12E-01**	**9.30E-01**	Note 1
Butan-1-ol	71-36-3	6.19%			9.10E-02	3.99E-01	**9.10E-02**	**3.99E-01**	Note 1
Mesitylene	108-67-8	3.30%			4.85E-02	2.13E-01	**4.85E-02**	**2.13E-01**	Note 1

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
15.50 Tons/Year

Flow Diagram Designation
Paint Line #1
EU71

Maximum Hourly Capacity
3.54 Lbs/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #1
Control Device: Paint Line #1 Booth Filter (CU17)
SCC Code:
Control Device Outlet: 0.0015 gr/dscf
Airflow: 20,310 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.34	0.34	0.34			0.14			
(source)		Note 1	Note 2	Note 2			Note 3			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency		99.50	99.50	99.50						
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.301	0.301	0.301			0.513			
Annual (TPY)		**1.318**	**1.318**	**1.318**			**2.244**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.301	0.301	0.301			0.513			
Annual (TPY)		**1.318**	**1.318**	**1.318**			**2.244**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Geomet 360 SDS (midpoint of % solids range)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM
Note 3: Geomet 360 Air Quality Data Sheet (1.6 lb/gal VOC at coating density of 11.05 lbs/gal
Note 4: Above quantities and emission factors disregard DI water that is used as a thinner

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene	83-32-9								
Acenaphthylene	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1	3.40%			1.20E-01	5.27E-01	**1.20E-01**	**5.27E-01**	Note 3
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
	Total HAPs	**3.40%**			1.20E-01	5.27E-01	1.20E-01	5.27E-01	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #1

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Aluminum Powder	7429-90-5	8.50%			2.56E-02	1.12E-01	**2.56E-02**	**1.12E-01**	Note 1
Distillates (petroleum), hydrotreated light	64742-47-8	1.00%			3.01E-03	1.32E-02	**3.01E-03**	**1.32E-02**	Note 1
Naphtha, hdrotreated heavy	64742-48-9	1.00%			3.01E-03	1.32E-02	**3.01E-03**	**1.32E-02**	Note 1
Zinc Powder	7440-66-6	25.00%			7.52E-02	3.29E-01	**7.52E-02**	**3.29E-01**	Note 1

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Emergency Generator #1
EU72
Process Description:
Emergency Generator #1
Control Device:

Inputs

1050.0	= Max. Hourly Power Output (HP)
7,000	= Btu/hp-hr (AP-42 Table 3.3-1, footnote e)
150000.0	= Maximum Hourly Heat Input (Btu)
100	= Maximum Operation (hours/year)
15	= Maximum Hourly Annual Input (MMBtu)

POLLUTANT	CAS #	Note 1 Emission Factor (lb/MMBtu)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	6.97E-02	1.05E-02	5.23E-04	
NOx	n/a	3.20E+00	4.80E-01	2.40E-02	
CO	n/a	8.50E-01	1.28E-01	6.38E-03	
Lead	n/a				
SO2	n/a	1.52E+00	2.27E-01	1.14E-02	
VOC	n/a	9.00E-02	1.35E-02	6.75E-04	
CO_2e	n/a	1.65E+02	2.48E+01	1.24E+00	
Arsenic (As)	7440-38-2				
Beryllium (Be)	7440-41-7				
Cadmium (Cd)	7440-43-9				
Chromium (Cr)	7440-47-3				
Cobalt (Co)	7440-48-4				
Lead (Pb)	7439-92-1				
Manganese (Mn)	7439-96-5				
Mercury (Hg)	7439-97-6				
Nickel (Ni)	7440-02-0				
Selenium (Se)	7782-49-2				
1,3-Butadiene	106-99-0				
2-Methylnaphthalene (POM)	91-57-6				
3-Methylchloranthrene (POM)	56-49-5				
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6				
Acenaphthene	83-32-9	4.68E-06	7.02E-07	3.51E-08	Note 3
Acenaphthylene	208-96-8	9.23E-06	1.38E-06	6.92E-08	Note 3
Acetaldehyde	75-07-0	2.52E-05	3.78E-06	1.89E-07	
Acrolein	107-02-8	7.88E-06	1.18E-06	5.91E-08	Note 2
Anthracene	120-12-7	1.23E-06	1.85E-07	9.23E-09	Note 3
Benz(a)anthracene (POM)	56-55-3	6.22E-07	9.33E-08	4.67E-09	Note 3
Benzene	71-43-2	7.76E-04	1.16E-04	5.82E-06	
Benzo(a)pyrene (POM)	50-32-8	2.57E-07	3.86E-08	1.93E-09	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.11E-06	1.67E-07	8.33E-09	Note 3
Benzo(g,h,i)perylene (POM)	191-24-2	5.56E-07	8.34E-08	4.17E-09	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	2.18E-07	3.27E-08	1.64E-09	Note 2,3
Chrysene (POM)	218-01-9	1.53E-06	2.30E-07	1.15E-08	Note 3
Dibenzo(a,h)anthracene (POM)	53-70-3	3.46E-07	5.19E-08	2.60E-09	Note 2,3
Dichlorobenzene	25321-22-6				
Fluoranthene (POM)	206-44-0	4.03E-06	6.05E-07	3.02E-08	Note 3
Fluorene (POM)	86-73-7	1.28E-05	1.92E-06	9.60E-08	Note 3
Formaldehyde	50-00-0	7.89E-05	1.18E-05	5.92E-07	
Hexane	110-54-3				
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	4.14E-07	6.21E-08	3.11E-09	Note 2,3
Naphthalene	91-20-3	1.30E-04	1.95E-05	9.75E-07	
Phenanathrene (POM)	85-01-8	4.08E-05	6.12E-06	3.06E-07	Note 3
Pyrene (POM)	129-00-0	3.71E-06	5.57E-07	2.78E-08	Note 3
Toluene	108-88-3	2.81E-04	4.22E-05	2.11E-06	
Xylenes	1330-20-7	1.93E-04	2.90E-05	1.45E-06	
Total POM			1.22E-05	6.11E-07	
Total HAPs			2.36E-04	1.18E-05	

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Emergency Generator #2
EU73
Process Description:
Emergency Generator #2
Control Device:

Inputs

1050.0	= Max. Hourly Power Output (HP)
7,000	= Btu/hp-hr (AP-42 Table 3.4-1, footnote e)
150000.0	= Maximum Hourly Heat Input (Btu)
100	= Maximum Operation (hours/year)
15	= Maximum Hourly Annual Input (MMBtu)

POLLUTANT	CAS #	Note 1 Emission Factor (lb/MMBtu)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a	6.97E-02	1.05E-02	5.23E-04	
NOx	n/a	3.20E+00	4.80E-01	2.40E-02	
CO	n/a	8.50E-01	1.28E-01	6.38E-03	
Lead	n/a				
SO2	n/a	1.52E+00	2.28E-01	1.14E-02	
VOC	n/a	9.00E-02	1.35E-02	6.75E-04	
CO_2e	n/a	1.65E+02	2.48E+01	1.24E+00	
Arsenic (As)	7440-38-2				
Beryllium (Be)	7440-41-7				
Cadmium (Cd)	7440-43-9				
Chromium (Cr)	7440-47-3				
Cobalt (Co)	7440-48-4				
Lead (Pb)	7439-92-1				
Manganese (Mn)	7439-96-5				
Mercury (Hg)	7439-97-6				
Nickel (Ni)	7440-02-0				
Selenium (Se)	7782-49-2				
1,3-Butadiene	106-99-0				
2-Methylnaphthalene (POM)	91-57-6				
3-Methylchloranthrene (POM)	56-49-5				
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6				
Acenaphthene	83-32-9	4.68E-06	7.02E-07	3.51E-08	Note 3
Acenaphthylene	208-96-8	9.23E-06	1.38E-06	6.92E-08	Note 3
Acetaldehyde	75-07-0	2.52E-05	3.78E-06	1.89E-07	
Acrolein	107-02-8	7.88E-06	1.18E-06	5.91E-08	Note 2
Anthracene	120-12-7	1.23E-06	1.85E-07	9.23E-09	Note 3
Benz(a)anthracene (POM)	56-55-3	6.22E-07	9.33E-08	4.67E-09	Note 3
Benzene	71-43-2	7.76E-04	1.16E-04	5.82E-06	
Benzo(a)pyrene (POM)	50-32-8	2.57E-07	3.86E-08	1.93E-09	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.11E-06	1.67E-07	8.33E-09	Note 3
Benzo(g,h,i)perylene (POM)	191-24-2	5.56E-07	8.34E-08	4.17E-09	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	2.18E-07	3.27E-08	1.64E-09	Note 2,3
Chrysene (POM)	218-01-9	1.53E-06	2.30E-07	1.15E-08	Note 3
Dibenzo(a,h)anthracene (POM)	53-70-3	3.46E-07	5.19E-08	2.60E-09	Note 2,3
Dichlorobenzene	25321-22-6				
Fluoranthene (POM)	206-44-0	4.03E-06	6.05E-07	3.02E-08	Note 3
Fluorene (POM)	86-73-7	1.28E-05	1.92E-06	9.60E-08	Note 3
Formaldehyde	50-00-0	7.89E-05	1.18E-05	5.92E-07	
Hexane	110-54-3				
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	4.14E-07	6.21E-08	3.11E-09	Note 2,3
Naphthalene	91-20-3	1.30E-04	1.95E-05	9.75E-07	
Phenanathrene (POM)	85-01-8	4.08E-05	6.12E-06	3.06E-07	Note 3
Pyrene (POM)	129-00-0	3.71E-06	5.57E-07	2.78E-08	Note 3
Toluene	108-88-3	2.81E-04	4.22E-05	2.11E-06	
Xylenes	1330-20-7	1.93E-04	2.90E-05	1.45E-06	
Total POM			1.22E-05	6.11E-07	
Total HAPs			2.36E-04	1.18E-05	

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Flow Diagram Designation
Emergency Generator #3
EU74
Process Description:
Emergency Generator #3
Control Device:

Inputs

56.0	= Max. Hourly Power Output (HP)
7,000	= Btu/hp-hr (AP-42 Table 3.3-1, footnote a)
8000.0	= Maximum Hourly Heat Input (Btu)
100	= Maximum Operation (hours/year)
0.8	= Maximum Hourly Annual Input (MMBtu)

POLLUTANT	CAS #	Note 1 Emission Factor (lb/MMBtu)	Maximum Emissions (lbs/hr)	Maximum Emissions (tpy)	
PM/PM10/PM2.5	n/a				
NOx	n/a	4.41E+00	3.53E-02	1.76E-03	
CO	n/a	9.50E-01	7.60E-03	3.80E-04	
Lead	n/a				
SO2	n/a	2.90E-01	2.32E-03	1.16E-04	
VOC	n/a	3.50E-01	2.80E-03	1.40E-04	
CO_2e	n/a	1.64E+02	1.31E+00	6.56E-02	
Arsenic (As)	7440-38-2				
Beryllium (Be)	7440-41-7				
Cadmium (Cd)	7440-43-9				
Chromium (Cr)	7440-47-3				
Cobalt (Co)	7440-48-4				
Lead (Pb)	7439-92-1				
Manganese (Mn)	7439-96-5				
Mercury (Hg)	7439-97-6				
Nickel (Ni)	7440-02-0				
Selenium (Se)	7782-49-2				
1,3-Butadiene	106-99-0	3.91E-05	3.13E-07	1.56E-08	Note 2
2-Methylnaphthalene (POM)	91-57-6				
3-Methylchloranthrene (POM)	56-49-5				
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6				
Acenaphthene	83-32-9	1.42E-06	1.14E-08	5.68E-10	Note 2,3
Acenaphthylene	208-96-8	5.06E-06	4.05E-08	2.02E-09	Note 2,3
Acetaldehyde	75-07-0	7.67E-04	6.14E-06	3.07E-07	
Acrolein	107-02-8	9.25E-05	7.40E-07	3.70E-08	Note 2
Anthracene	120-12-7	1.87E-06	1.50E-08	7.48E-10	Note 3
Benz(a)anthracene (POM)	56-55-3	1.68E-06	1.34E-08	6.72E-10	Note 3
Benzene	71-43-2	9.33E-04	7.46E-06	3.73E-07	
Benzo(a)pyrene (POM)	50-32-8	1.88E-07	1.50E-09	7.52E-11	Note 2,3
Benzo(b)fluoranthene (POM)	205-99-2	9.91E-08	7.93E-10	3.96E-11	Note 2,3
Benzo(g,h,i)perylene (POM)	191-24-2	4.89E-07	3.91E-09	1.96E-10	Note 2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.55E-07	1.24E-09	6.20E-11	Note 2,3
Chrysene (POM)	218-01-9	3.53E-07	2.82E-09	1.41E-10	Note 3
Dibenzo(a,h)anthracene (POM)	53-70-3	5.83E-07	4.66E-09	2.33E-10	Note 2,3
Dichlorobenzene	25321-22-6				
Fluoranthene (POM)	206-44-0	7.61E-06	6.09E-08	3.04E-09	Note 3
Fluorene (POM)	86-73-7	2.92E-05	2.34E-07	1.17E-08	Note 3
Formaldehyde	50-00-0	1.18E-03	9.44E-06	4.72E-07	
Hexane	110-54-3				
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	3.75E-07	3.00E-09	1.50E-10	Note 2,3
Naphthalene	91-20-3	8.48E-05	6.78E-07	3.39E-08	
Phenanathrene (POM)	85-01-8	2.94E-05	2.35E-07	1.18E-08	Note 3
Pyrene (POM)	129-00-0	4.78E-06	3.82E-08	1.91E-09	Note 3
Toluene	108-88-3	4.09E-04	3.27E-06	1.64E-07	
Xylenes	1330-20-7	2.85E-04	2.28E-06	1.14E-07	
Total POM			6.66E-07	3.33E-08	
Total HAPs			3.10E-05	1.55E-06	

Note 1: AP-42, 10/1996, Section 3.3, Tables 3.3-1 and 3.3-2 [Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

EXAMPLE CALCULATIONS:
Maximum Hourly Emission = Max.hourly Fuel Usage rate (standard cubic feet hour) x (Pollutant E.F.)
Maximum Yearly Emission = Max.Hourly Emission Rate (lb/hr) x (Maximum Hours of Operation)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Tank No.	Diesel Storage Tank (1000 gallon)	**Tank type**	Horizontal	**Date**		01/02/23	
Material stored	Fuel Oil No. 2 (Diesel)	**Company**	Fritz Winter North America	**Performed by**		Craig Schmeisser	
City	Franklin	**State**	KY			Mad River Strategies, LLC	
Description	Diesel Storage Tank (1000 gallon)						

INPUT DATA					CALCULATIONS				
	Reference	**Symbol**	**Values**	**Units**		**Reference**	**Symbol**		**Units**
					Breathing losses				
Molecular Weight					Tank vapor space volume	AP-42, Section 7.1, pg 7.1-16, Eq. 1-3	V_V	136.92	ft^3
Molecular weight	AP-42, Section 7.1, Table 7.1-2, pg 7.1-92	M_V	130	Lb/lb-mole	Vapor density	AP-42, Section 7.1, pg 7.1-23, Eq. 1-22	W_V	1.591E-04	lb/ft^3
Tank design data					Vapor space expansion factor	AP-42, Section 7.1, pg 7.1-20, Eq. 1-12	K_E	0.03212	Dimensionless
Shell height	See Horizontal Tank Calcs Below - Calculated	H or H_E	4.42	ft	Vented vapor saturation factor	AP-42, Section 7.1, pg 7.1-22, Eq. 1-21	K_S	0.9992	Dimensionless
Diameter	See Horizontal Tank Calcs Below - Calculated	D or D_E	8.88	ft					
Maximum liquid height	AP-42, Section 7.1, pg 7.1-28	H_{LX}	4.42	ft	**Standing Storage Loss (Breathing Loss)**	AP-42, Section 7.1, pg 7.1-16, Eq. 1-2	L_S	0.2551	lb/yr
Minimum liquid height	AP-42, Section 7.1, pg 7.1-28	H_{LN}	0.00	ft					
Vapor Space Outage	AP-42, Section 7.1, pg 7.1-21	H_{VO}	2.21	ft	**Working losses**	AP-42, Section 7.1, pg 7.1-28, Eq. 1-35	L_W	137.3876	lb/yr
Annual Sum of the increases in liquid level	AP-42, Section 7.1, pg 7.1-28, Eq. 1-37	$\sum H_{OI}$	69.07	ft/yr					
Tank Maximum Liquid Volume	AP-42, Section 7.1, pg 7.1-201, Eq. 60-4	V_{LX}	274	ft^3					
Turnovers	AP-42, Section 7.1, pg 7.1-28	N	16	Dimensionless	**TOTAL LOSSES**	Calculated	L_T	**137.6427**	lb/yr
Net throughput	Calculated @ 31.5 gals/bbl	Q	762	bbl/yr					
Turnover factor	AP-42, Section 7.1, pg 7.1-28	K_N	1.00	Dimensionless					
Working loss product factor	AP-42, Section 7.1, pg 7.1-28	K_P	1.00	Dimensionless					
Net working loss throughput	AP-42, Section 7.1, pg 7.1-29, Eq. 1-38	V_Q	4277.33	bb/yr					
Meteorological data									
Daily ave. ambient temp.	AP-42, Section 7.1, pg 7.1-26, Eq. 1-30	T_{AA}	519.85	°R					
Daily max. ambient temp.	AP-42, Section 7.1, Table 7.1-7, pg 7.1-132 Nashville, TN as location	T_{AX}	529.40	°R					
Daily min. ambient temp.	AP-42, Section 7.1, Table 7.1-7, pg 7.1-63 Nashville, TN as location	T_{AN}	510.30	°R					
Daily ambient temp. range	AP-42, Section 7.1, pg 7.1-19, Eq. 1-11	ΔT_A	19.10	°R					
Tank paint solar absorptance	AP-42, Section 7.1, Table 7.1-6, pg 7.1-102 White Tank	a	0.17	Dimensionless					
Daily total insolation factor	AP-42, Section 7.1, Table 7.1-7, pg 7.1-63 Nashville, TN as location	I	1,316	Btu/ft^2-day					
Liquid bulk temperature	AP-42, Section 7.1, pg 7.1-27, Eq. 1-31	T_B	520.52	°R					
Daily vapor temp. range	AP-42, Section 7.1, pg 7.1-18, Eq. 1-7	ΔT_V	17.84	°R					
Daily ave. liquid surface temp.	AP-42, Section 7.1, pg 7.1-26, Eq. 1-28	T_{LA}	521.37	°R					
Daily max. liquid surface temp.	AP-42, Section 7.1, pg 7.1-83, Fig. 7.1-17	T_{LX}	525.83	°R					
Daily min. liquid surface temp.	AP-42, Section 7.1, pg 7.1-83, Fig. 7.1-17	T_{LN}	516.91	°R					
Average vapor temperature	AP-42, Section 7.1, pg 7.1-27, Eq. 1-33	T_v	522.06	°R					
VP @ daily ave. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VA}	0.0069	psi					
VP @ daily max. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VX}	0.0079	psi					
VP @ daily min. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VN}	0.0059	psi					
Daily vapor pressure range	AP-42, Section 7.1, pg 7.1-18, Eq. 1-9	ΔP_V	0.0020	psia					
Breather vent pressure setting range	AP-42, Section 7.1, pg 7.1-19, Eq. 1-10	ΔP_B	0.06	psig					
Breather vent pressure setting	AP-42, Section 7.1, pg 7.1-19	P_{BP}	0.03	psig					
Breather vent vacuum setting	AP-42, Section 7.1, pg 7.1-19	P_{BV}	(0.03)	psig					
Vent setting correction factor	AP-42, Section 7.1, pg 7.1-28, Eq. 1-37 notes	Kb	1.00	Dimensionless					

INPUT DATA					CALCULATIONS				
	Reference	**Symbol**		**Units**			**Symbol**		**Units**
Calculations for Horizontal Tanks					**Constants**				
Effective Diameter Calculation					Ideal Gas Constant	Input	R	10.731	psia*ft^3/lb-mole**R
Length	Input	L	11.00	ft	ASTM-D86 distillation slope				
Diameter	Input	D	5.63	ft		AP-42, Section 7.1, Table 7.1-2, pg 7.1-92	S		°F/vol %
Effective Diameter	AP-42, Section 7.1, pg 7.1-21, Eq. 1-14	D_e	8.88	ft	Constant in VP Equation	AP-42, Section 7.1, pg 7.1-82, Fig. 7.1-15	A	12.101	Dimensionless
					Constant in VP Equation	AP-42, Section 7.1, pg 7.1-82, Fig. 7.1-15	B	8907	°R
Effective Height Calculation									
Effective Height	AP-42, Section 7.1, pg 7.1-21, Eq. 1-15	H_e	4.422	ft					
Annual Throughput Rate									
Diesel	Air Permit Application	None	24000	gal					

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Snag Grinder #1
EU77

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Snag Grinder #1
Control Device: Snag Grinder #1 Fabric Filter
SCC Code:
Control Device Outlet: 0.0030 gr/dscf
Airflow: 1,500 acfm
Stack Gas Temperature: 68 °F

Facility Process Name:		**Criteria Pollutants**								
	Snag Grinder #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.005	0.005						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.039	0.039	0.039						
	Annual (TPY)	**0.170**	**0.170**	**0.170**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.039	0.039	0.039						
	Annual (TPY)	**0.170**	**0.170**	**0.170**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Snag Grinder #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
45,793 Tons/Year

Flow Diagram Designation
Snag Grinder #2
EU78

Maximum Hourly Capacity
12.65 Tons/Hour

Process Description:
Fritz Winter North America, LP
Snag Grinder #2
Control Device: Snag Grinder #2 Fabric Filter
SCC Code:
Control Device Outlet: 0.0030 gr/dscf
Airflow: 1,500 acfm
Stack Gas Temperature: 68 °F

Facility Process Name:		**Criteria Pollutants**								
	Snag Grinder #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.005	0.005						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.039	0.039	0.039						
	Annual (TPY)	**0.170**	**0.170**	**0.170**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.039	0.039	0.039						
	Annual (TPY)	**0.170**	**0.170**	**0.170**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Snag Grinder #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
135.0 Tons/Year Note 1

Flow Diagram Designation
Core Wash Station #2
EU79

Maximum Hourly Capacity
0.338 Tons/Hour Note 1

Process Description:
Fritz Winter North America, LP
Core Wash Station #2
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: 0.0020 gr/dscf
Airflow: 652 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Core Wash Station #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						0.76%			
(source)							Note 2			
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.013	0.013	0.013			5.130			
	Annual (TPY)	**0.056**	**0.056**	**0.056**			**1.026**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.013	0.013	0.013			5.130			
	Annual (TPY)	**0.056**	**0.056**	**0.056**			**1.026**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Usage from original permit application
Note 2: VOC Content from original permit application; ASK rep indicated less than 0.1% VOC

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Wash Station #2

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
135.0 Tons/Year Note 1

Flow Diagram Designation
Core Wash Station #3
EU80

Maximum Hourly Capacity
0.338 Tons/Hour Note 1

Process Description:
Fritz Winter North America, LP
Core Wash Station #3
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: 0.0020 gr/dscf
Airflow: 652 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Core Wash Station #3									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						0.76%			
(source)							Note 2			
Capture Efficiency		100.000	100.000	100.000						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.013	0.013	0.013			5.130			
Annual (TPY)		**0.056**	**0.056**	**0.056**			**1.026**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.013	0.013	0.013			5.130			
Annual (TPY)		**0.056**	**0.056**	**0.056**			**1.026**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Usage from original permit application
Note 2: VOC Content from original permit application; ASK rep indicated less than 0.1% VOC

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Wash Station #3

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
135.0 Tons/Year Note 1

Flow Diagram Designation
Core Wash Station #4
EU81

Maximum Hourly Capacity
0.338 Tons/Hour Note 1

Process Description:
Fritz Winter North America, LP
Core Wash Station #4
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: 0.0020 gr/dscf
Airflow: 652 acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Core Wash Station #4									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						0.76%			
(source)							Note 2			
Capture Efficiency		100.000	100.000	100.000						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.013	0.013	0.013			5.130			
Annual (TPY)		**0.056**	**0.056**	**0.056**			**1.026**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.013	0.013	0.013			5.130			
Annual (TPY)		**0.056**	**0.056**	**0.056**			**1.026**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Usage from original permit application
Note 2: VOC Content from original permit application; ASK rep indicated less than 0.1% VOC

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Wash Station #4

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
10.0 Tons/Year

Flow Diagram Designation
Rust Prohibitive Application
EU82

Maximum Hourly Capacity
0.013 Tons/Hour

Process Description:
Fritz Winter North America, LP
Rust Prohibitive Application
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Rust Prohibitive Application									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						10.00%			
(source)							Note 1,2			
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)							2.500			
Annual (TPY)							**1.000**			
Total Emission Rate:										
Hourly (lb/hr)							2.500			
Annual (TPY)							**1.000**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Weight loss study
Note 2: Usage is for virgin product. Virgin product is thinned with water prior to use.

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Rust Prohibitive Application

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene	83-32-9							
Acenaphthylene	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
Total HAPs								

Attachment #3
Revised DEP7007GG Form

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007GG

Control Equipment

Additional Documentation

___ Complete Sections GG.1 through GG.12, as applicable

___ Attach manufacturer's specifications for each control device

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 11/30/2021

Section GG.1: General Information - Control Equipment

Control Device ID #	Control Device Name	Cost	Manufacturer	Model Name/ Serial #	Date Installed	Inlet Gas Stream Data For All Control Devices					Inlet Gas Stream Data For Condensers, Adsorbers, Afterburners, Incinerators, Oxidizers Only			Equipment Operational Data For All Control Devices		
						Temperature (°F)	Flowrate (scfm @ 68°F)	Average Particle Diameter (μm)	Particle Density (lb/ft^3) or Specific Gravity	Gas Density (lb/ft^3)	Gas Moisture Content (%)	Gas Composition	Fan Type	Pressure Drop Range (in. H_2O)	Pollutants Collected/ Controlled	Pollutant Removal (%)
CU01	Melt Baghouse	--	Luehr Filter	3249.01/16	Aug-16	90.0	153600	N/K	N/K	N/K	N/A	N/A	N/A	0.5-12.0	Particulate Matter	99.5+ est.
CU02	Melt and Core/Mold Baghouse	--	Luehr Filter	Custom Fabrication	Aug-16	68.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.
CU03	Mold Silica Sand Silo Bin Vent Filter	--	Sand Mold Systems	Custom Fabrication	Aug-16	68.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.
CU04	Blend Silo Bin Vent Filter	--	Sand Mold Systems	Custom Fabrication	Aug-16	68.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.
CU05	Bentonite Silo Bin Vent Filter	--	Sand Mold Systems	Custom Fabrication	Aug-16	68.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.
CU06	Sand Plant Baghouse	--	Luehr Filter	3249.02/16	Aug-16	80.0	102667	N/K	N/K	N/K	N/A	N/A	N/A	0.5-12.0	Particulate Matter	99.5+ est.
CU07	Acid Scrubber	--	BGT	GKX 24	Aug-16	68.0	15000	N/K	N/K	N/K	N/A	N/A	N/A	0.25-8.0	Amine Gas	98+
CU08	Core/Mold Baghouse	--	Luehr Filter	3249.04/16	Oct-18	90.0	110400	N/K	N/K	N/K	N/A	N/A	N/A	0.5-12.0	Particulate Matter	99.5+ est.
CU10	Sand Plant Baghouse Waste Sand Silo	--	Sand Mold Systems	Custom Fabrication	Aug-16	68	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007GG

Control Equipment

Additional Documentation

___ Complete Sections GG.1 through GG.12, as applicable

___ Attach manufacturer's specifications for each control device

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 11/30/2021

Section GG.1: General Information - Control Equipment

Control Device ID #	Control Device Name	Cost	Manufacturer	Model Name/ Serial #	Date Installed	Inlet Gas Stream Data For All Control Devices					Inlet Gas Stream Data For Condensers, Adsorbers, Afterburners, Incinerators, Oxidizers Only			Equipment Operational Data For All Control Devices		
						Temperature (°F)	Flowrate (scfm @ 68°F)	Average Particle Diameter (μm)	Particle Density (lb/ft^3) or Specific Gravity	Gas Density (lb/ft^3)	Gas Moisture Content (%)	Gas Composition	Fan Type	Pressure Drop Range (in. H_2O)	Pollutants Collected/ Controlled	Pollutant Removal (%)
CU11	Fettling Baghouse	--	Luehr Filter	3249.03/16	Aug-16	55	66641	N/K	N/K	N/K	N/A	N/A	N/A	0.5-12	Particulate Matter	99.5+ est.
CU12	Fettling Baghouse Waste Dust Silo Bin Vent Filter	--	Luehr Filter	Custom Fabrication	Apr-17	68.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.
CU13a-CU13h	Machining Cartridge Filters	--	EMAG	VL8	Jun-17	68	598	N/K	N/K	N/K	N/A	N/A	N/A	0.1-6.0	Particulate Matter	99.5+ est.
CU13i-CU13j	Machining Cartridge Filters	--	Sturm	ZS16	Sep-18	68	8073	N/K	N/K	N/K	N/A	N/A	N/A	0.1-6.0	Particulate Matter	99.5+ est.
CU14	Paint Line #3 Booth Filter	--	Sturm	ZS16	Sep-18	82	2679	N/K	N/K	N/K	N/A	N/A	N/A	602 (1.5 bar)	Particulate Matter	99.5+ est.
CU15	Paint Line #2 Booth Filter	--	Sturm	ZS16	Nov-17	82	2679	N/K	N/K	N/K	N/A	N/A	N/A	602 (1.5 bar)	Particulate Matter	99.5+ est.
CU17	Paint Line #1 Booth Filter	--	Sturm	ZS16	Mar-17	75	20044	N/K	N/K	N/K	N/A	N/A	N/A	602 (1.5 bar)	Particulate Matter	99.5+ est.
CU19	Core Silica Sand Silo A Bin Vent Filter	--			Feb-17	68.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.
CU20	Core Silica Sand Silo B Bin Vent Filter	--			Feb-17	68.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007GG

Control Equipment

Additional Documentation

___ Complete Sections GG.1 through GG.12, as applicable

___ Attach manufacturer's specifications for each control device

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 4/5/2021

Section GG.1: General Information - Control Equipment

Control Device ID #	Control Device Name	Cost	Manufacturer	Model Name/ Serial #	Date Installed	Inlet Gas Stream Data For All Control Devices					Inlet Gas Stream Data For Condensers, Adsorbers, Afterburners, Incinerators, Oxidizers Only			Equipment Operational Data For All Control Devices		
						Temperature (°F)	Flowrate (scfm @ 68°F)	Average Particle Diameter (μm)	Particle Density (lb/ft^3) or Specific Gravity	Gas Density (lb/ft^3)	Gas Moisture Content (%)	Gas Composition	Fan Type	Pressure Drop Range (in. H_2O)	Pollutants Collected/ Controlled	Pollutant Removal (%)
CU21	Snag Grinder #1 Fabric Filter	-				68		N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0	Particulate Matter	99.5+ est.
CU22	Snag Grinder #2 Fabric Filter	-				68		N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0	Particulate Matter	99.5+ est.

Section GG.5: Scrubber

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Scrubber	Identify Type of Scrubber: Venturi, Packed Bed, Spray Tower, or Other (specify)	For Venturi Scrubbers:	For Packed Bed Scrubbers:		For Spray Towers:		Identify Type of Flow: Concurrent, Countercurrent, or Crossflow	Length in Direction of Gas Flow *(ft)*	Cross-Sectional Area *(ft^2)*	Venturi Throat Velocity *(ft/s)*	Mist Eliminator			Scrubbing Liquid			
			Identify Throat Type: Fixed or Adjustable	Identify Packing Type	Packing Height *(in)*	Number of Nozzles	Nozzle Pressure *(psig)*					Identify Type: Mesh or Vane	Cross-Sectional Area *(ft^2)*	Pressure Drop *(in. H_2O)*	Chemical Composition	Flowrate *(gal/min)*	Fresh Liquid Makeup Rate *(gal/min)*	Describe Disposal Method of Scrubber Effluent
CU07	EU39, EU40, EU41, EU42	Packed Bed	NA	VSP 50	157.48	NA	NA	Countercurrent	26.1	48.69	NA	NA	NA	NA	H_2SO_4	176.11	1.76	Auto-discharge into a tote (IBC)

Section GG.6: Filter

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Filter	Identify Type of Filter Unit: Baghouse, Cartridge Collector, or Other (specify)	Identify Type of Filtering Material: Fabric, Paper, Synthetic, or Other (specify)	Total Filter Area (ft^2)	Effective Air-to-Filter Ratio ($acfm/ft^2$)	Continuous Monitoring Instrumentation (e.g. COMS, BLDS, none)	Additional Materials Introduced into the Control System (e.g. lime, carbon)		Identify Cleaning Method: Shaker, Pulse Air, Reverse Air, Pulse Jet, or Other (specify)	Identify Gas Cooling Method: Ductwork, Heat Exchanger, Bleed-in Air, Water Spray, or Other (specify)	For Ductwork:		For Bleed-in Air:	For Water Spray:
							Material	Injection Rate (lb/hr)			Length (ft)	Diameter (ft)	Flowrate (scfm @ 68°F)	Flowrate (gal/min)
CU01	EU01 (secondary), EU05 (sec), EU06(sec), EU07, EU08, EU09, EU10, EU13 (sec), EU16 (sec), EU18 (sec)	Baghouse	Fabric			BLDS Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU02	EU17	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU03	EU19	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU04	EU20	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU05	EU21	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU06	EU22, EU53	Baghouse	Fabric			BLDS Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU08	EU33, EU35A (sec), EU35B (sec), EU36, EU43 (sec), EU44, EU45, EU46, EU47, EU50, EU51, EU52, EU59, EU79 (sec), EU80 (sec), EU81 (sec)	Baghouse	Fabric			BLDS Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU10	EU57	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA

Section GG.6: Filter

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Filter	Identify Type of Filter Unit: Baghouse, Cartridge Collector, or Other (specify)	Identify Type of Filtering Material: Fabric, Paper, Synthetic, or Other (specify)	Total Filter Area (ft^2)	Effective Air-to-Filter Ratio ($acfm/ft^2$)	Continuous Monitoring Instrumentation (e.g. COMS, BLDS, none)	Additional Materials Introduced into the Control System (e.g. lime, carbon)		Identify Cleaning Method: Shaker, Pulse Air, Reverse Air, Pulse Jet, or Other (specify)	Identify Gas Cooling Method: Ductwork, Heat Exchanger, Bleed-in Air, Water Spray, or Other (specify)	For Ductwork:		For Bleed-in Air:	For Water Spray:
							Material	Injection Rate (lb/hr)			Length (ft)	Diameter (ft)	Flowrate ($scfm$ @ 68°F)	Flowrate (gal/min)
CU11	EU60 (sec), EU61, EU62, EU64, EU65, EU77 (sec), EU78 (sec)	Baghouse	Fabric			BLDS	NA	NA	Pulse Jet	Ductwork			NA	NA
CU12	EU63	Bin Vent Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA
CU13 a-h	EU66	Cartridge Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA
CU13 i-j	EU67	Cartridge Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA
CU14	EU68	Paint Booth Filter				Magnahelic	NA	NA	None	NA	NA	NA	NA	NA
CU15	EU69	Paint Booth Filter				Magnahelic	NA	NA	None	NA	NA	NA	NA	NA
CU17	EU66 (sec), EU67 (sec), EU71, EU82 (sec)	Paint Booth Filter				Magnahelic	NA	NA	None	NA	NA	NA	NA	NA
CU19	EU35A	Bin Vent Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA
CU20	EU35B	Bin Vent Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA

Section GG.6: Filter

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Filter	Identify Type of Filter Unit: Baghouse, Cartridge Collector, or Other (specify)	Identify Type of Filtering Material: Fabric, Paper, Synthetic, or Other (specify)	Total Filter Area (ft^2)	Effective Air-to-Filter Ratio ($acfm/ft^2$)	Continuous Monitoring Instrumentation (e.g. COMS, BLDS, none)	Additional Materials Introduced into the Control System (e.g. lime, carbon)		Identify Cleaning Method: Shaker, Pulse Air, Reverse Air, Pulse Jet, or Other (specify)	Identify Gas Cooling Method: Ductwork, Heat Exchanger, Bleed-in Air, Water Spray, or Other (specify)	For Ductwork:		For Bleed-in Air:	For Water Spray:
							Material	Injection Rate (lb/hr)			Length (ft)	Diameter (ft)	Flowrate (scfm @ 68°F)	Flowrate (gal/min)
CU21	EU77	Fabric Filter	Fabric	NK	NK	None	NA	NA	N/A	NA	-	-	NA	NA
CU22	EU78	Fabric Filter	Fabric	NK	NK	None	NA	NA	N/A	NA	-	-	NA	NA

Section GG.12: Notes, Comments, and Explanations

Attachment #4
Ohio EPA RACM Sections

2.22 CONCRETE BATCHING PLANTS

2.22.1 Process Description[1]

There are three general types of concrete batching plants. They are batching (into transit-mix trucks) plants, central-mix plants and dry-batching (into flat-bed trucks) plants.

Concrete batching plants store, convey, measure and blend the components for making concrete. The plants are similar in the method by which the solid raw materials (sand, aggregate and cement) are received, stored, transferred and blended, but differ with respect to where the water is added to the mix.[2]

The raw materials are delivered to the plant by rail or truck. The cement is transferred pneumatically (most commonly) or by bucket elevator to elevated storage silos. The sand and aggregate are generally stored on the ground and transferred to elevated bins via belt conveyor or bucket elevator. From the overhead bins, the materials are dropped into weigh hoppers which weigh out the proper amount of each material.

In batching plants that load transit-mix trucks, the weighed aggregates and cement are dropped into a receiving hopper. The required amount of water is injected into the flowing stream of solids as the mixture of material is emptied from the receiving hopper into the transit-mix truck. The transit-mix trucks mix the batch en route to the site where the concrete is to be poured.

Dry-batch plants mix sand, aggregate and cement and then dump this dry mix into flat-bed trucks. These trucks transport the batch to paving machines at the job site where water is added and mixing takes place.

A central-mix plant uses a centrally located mixer to make wet concrete. The wet concrete is emptied into open-bed trucks and

transported to the job site where the concrete is to be poured.

A process flow diagram for concrete batching is shown in Figure 2.22-1. One of the fugitive emission sources which is common to all concrete batch plants, but not specifically included in this section, is plant roads. Discussion of this fugitive dust source is presented in Section 2.1. Other fugitive emission sources at concrete batching plants include the sand and aggregate storage areas, transferring and conveying operations, cement unloading, cement silo vents, weigh hopper loading, mixer loading (central-mix plants), transit-mix truck loading operations (batching plants) and flat-bed truck loading operations (dry-batching plants).

2.22.2 Fugitive Dust Emission Factors

The potential sources of fugitive dust from concrete batching are shown in Table 2.22-1, along with the corresponding emission factors. All of these factors are based on either engineering judgment or visual observations. No details are available concerning the methodology of development. The reliability of these types of estimates is poor.

The emission factors for plant haul roads are not included in Table 2.22-1. Emission factors for these sources are listed in Section 2.1.

2.23.3 Particle Characterization

Practically all the fugitive dust generated at concrete batching plants is cement dust since most of the sand and aggregate used is damp. Therefore, this section will only concentrate on particle characteristics of cement dust.

The typical oxide composition of cement dust is as follows.[3]

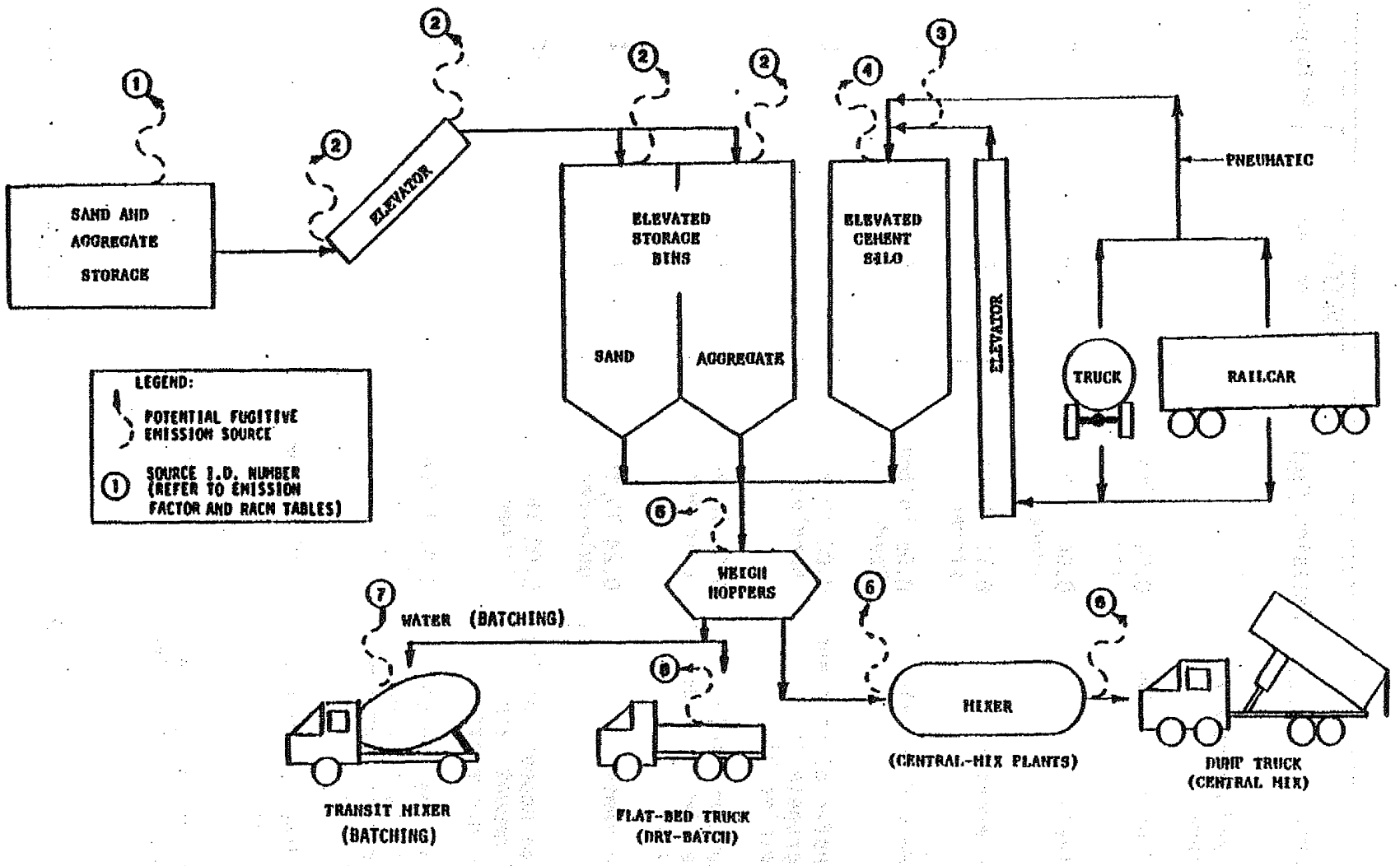

Figure 2.22-1. Simplified process flow diagram for concrete batching and associated fugitive particulate emission sources.

TABLE 2.22-1. FUGITIVE DUST EMISSION FACTORS FOR CONCRETE BATCHING PLANTS

	Source	Emission factor	Reliability rating	Reference
(1)	Sand and aggregate storage			
	loading onto piles	0.04 lb/ton loaded	D	2
	vehicular traffic	0.04 lb/ton stored	D	2
	wind erosion	0.11 lb/ton stored	D	2
	loadout from piles	0.05 lb/ton loaded	D	2
(2)	Transfer of sand and aggregate to elevated bins	0.04 lb/ton handled	E	2
(3)	Cement unloading to elevated storage silos	0.24 lb/ton unloaded	E	2
(4)	Silo vents	0.24 lb/ton unloaded	E	2
(5)	Weigh hopper loading of cement, sand and aggregate	0.02 lb/ton loaded	E	2
(6)	Mixer loading of cement, sand and aggregate (central-mix plant)	0.04 lb/ton loaded	E	2
(7)	Loading of transit-mix truck (batching plant)	0.02 lb/ton	E	2
(8)	Loading of flat-bed truck (dry-batching plant)	0.04 lb/ton	E	2

Compound	Fugitive Emission Oxide Composition, Percent By Weight For Cement Dust
Silica	18-23
Al_2O_3	3-8
Fe_2O_3	1-5
CaO	61-66
MgO	0-5
SO_3	2-4
Free Lime	0-2
Minor Compounds	0-1

The American Conference of Governmental Industrial Hygienists has established levels for which airborne chemical compounds could be tolerated without adverse effects on humans.[4] Of the above compounds, aluminum oxide, iron oxide, magnesium oxide and free lime are considered nuisance substances which can be tolerated at relatively high levels. Silica may be hazardous depending upon the amount of quartz contained in the silica. Calcium oxide can be tolerated at levels up to 5 mg/m^3.

Particle size characteristics of the dust vary according to the grades of cement. A range of 10 to 20 percent by weight of particles < 5μm in size is typical for the various grades of cement. Table 2.22-2 summarizes the particle size distribution and bulk density of three common grades of cement.[5]

Table 2.22-2. Physical Characteristics of Three Common Grades of Cement

Characteristic	Weight Percent of Cement		
Particle Size (μm)	Grade I	Grade II	Grade III
0 to 5	13.2	9.6	21.8
5 to 10	15.1	16.6	22.5
10 to 20	25.7	18.8	26.7
20 to 40	29.0	36.6	23.6
40 to 50	7.0	10.4	5.4
50 to 66	5.0	6.0	0
66 to 99	4.0	2.0	0
99 to 250	1.0	0	0
250 (60 mesh)	0	0	0
Bulk Density (lb/ft^3)	54.0	51.5	62.0

2.22.4 Control Methods

This section discusses all available control methods for the fugitive dust emission sources at concrete batching plants.

For the control of fugitive dust emissions from sand and aggregate storage piles, several control methods are available. For loading onto piles, the available control methods are stone ladders, wet suppression (chemical) and telescopic chutes. Loading out operations may be controlled by the use of wet suppression (chemical), watering and underpile conveyors which have a gravity feed to conveyors. For control of wind erosion emissions, the available control methods consist of enclosure (storage bins or silos), wet suppression (chemical) and watering. Lastly, fugitive dust generated by vehicular traffic associated with storage pile activities may be controlled by use of an enclosure, wet suppression (chemical), watering and by using traveling booms rather than vehicles to distribute material.

For control of fugitive dust emissions from plant roadways and parking areas, the reader is referred to Section 2.1.1 of this document.

The amount of fugitive dust generated during the transfer of sand and aggregate from storage to elevated storage bins depends primarily on the surface moisture content of these materials. To ensure that the material is sufficiently moist to prevent dusting, water sprays may be applied at the feed, transfer and discharge points of the belt conveyor or bucket elevator system. To prevent wind losses, most plants partially or completely enclose the conveyor system or use watering and/or chemical dust suppressants.[6] In addition, transfer points may be exhausted to fabric filters for control. Section 2.1.3 and 2.18 further discuss transfer and conveying sources in detail.

A typical cement-receiving and storage system is shown in Figure 2.22-2.[7] The receiving hopper is at or below ground level. If it is designed to fit the canvas discharge tube of the hopper truck, little or no dust is emitted at this point. After a brief, initial puff of dust, the hopper fills completely, and the cement flows from the truck without any free fall.

Cement elevators are either the vertical-screw type or the enclosed-bucket type. Because both are totally enclosed, neither emits any dust if in good condition.[8]

The cement silo must be vented to allow the air displaced by the incoming cement to escape. Unless this vent is filtered, a significant amount of dust escapes. Control can be accomplished by venting to a central dust collecting system or a single collector placed on top of each silo. A fabric type of collector is most often used to vent the cement silo. A fabric "sock", that is placed on each silo vent, can be operated without an exhaust fan when the material is delivered to the silo by bucket elevators because it is simply used to filter the small volume of air that is forced out.[9]

Pneumatic transfer of cement to elevated storage silos from trucks and railcars equipped with compressors and pneumatic delivery tubes is finding increased application over cement transfer by bucket elevator.[10] Pneumatic transfer eliminates emissions between the truck or railcar and the cement silo and requires control only at the cement silo vent by fabric filters. In plants receiving cement pneumatically, use of a fabric "sock" (filtered vent used for the gravity filling of cement) is inadequate.[11]

The volume of conveying air required in the pneumatic delivery system is about 350 cfm to 700 cfm depending on the loading cycle, etc.[12] Since the air is being forced into the silo, the baghouse will require a blower in order to relieve the pressure inside the

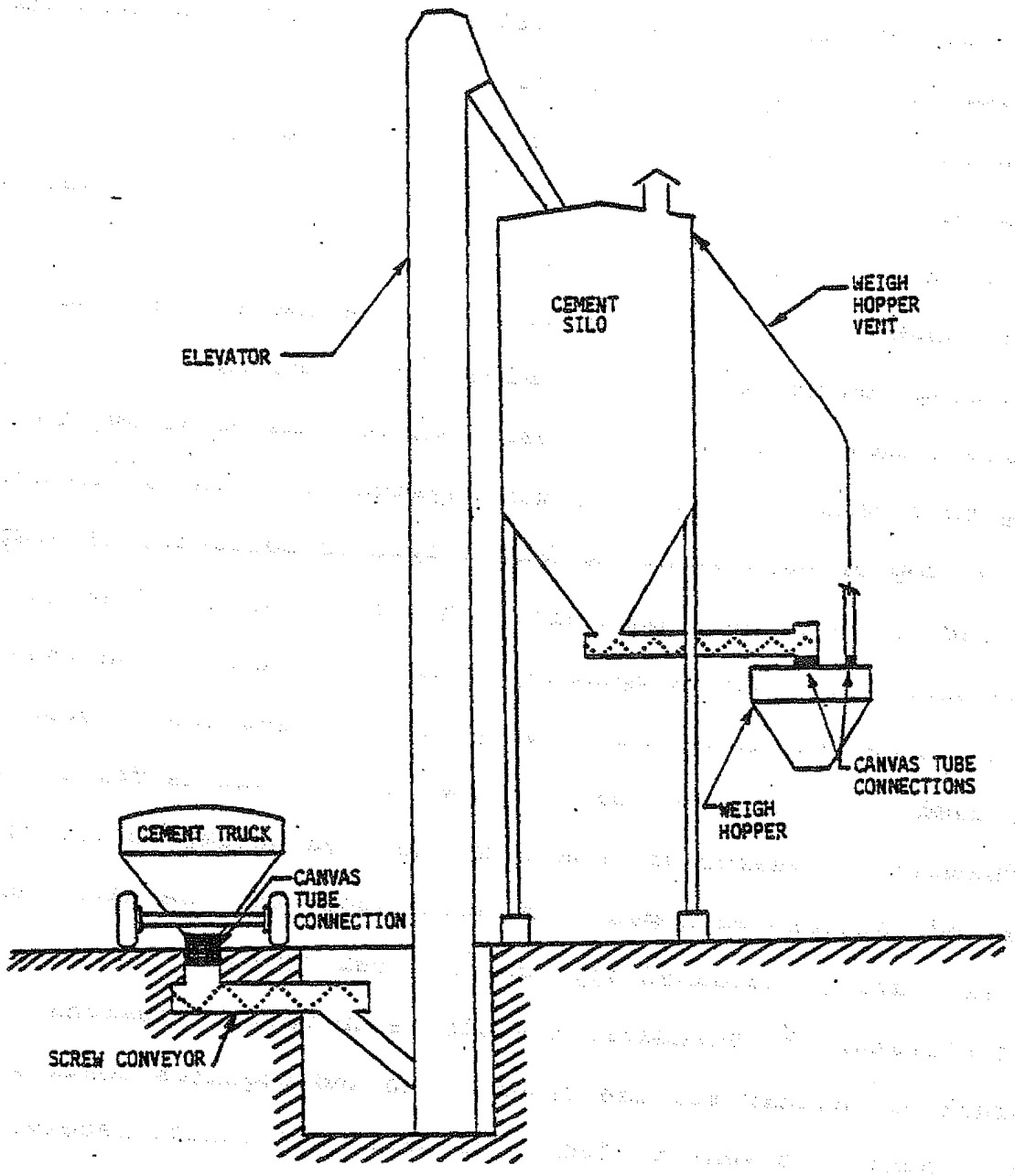

Figure 2.22-2. Cement-receiving and storage system.

silo, and allow flow through the fabric filter. A mechanical shaking mechanism also should be provided to prevent cement from blinding the filter cloth of the baghouse. A vent rate of approximately 1,200 to 1,300 cfm is generally required.[13] The negative pressure created by using a forced draft also prevents dust leakage around access doors and other openings.

Another less expensive type of control measure is to mount a bank of approximately four simple bin vent filters atop the silo. The filtering velocity should not exceed 7 cfm, giving a filter cloth area of approximately 100 square feet for the 700 cfm of air encountered at the end of the cycle. The filter design must include a shaking mechanism to prevent blinding of the filter cloth. The major disadvantage of using a bank of several simple bin vent filters as just described is the possibility of pressure build-up within the silo. If, for some reason, the filter should become blinded, there is a danger of rupturing the silo. Therefore, proper maintenance and regular inspection of the filters are essential.[14]

Where baghouses are used to control other larger cement dust sources as those existing in a dry-batching plant or in a central-mix plant, the cement silo can easily be vented to the same baghouse.[15]

The rapid discharge of sand, aggregate and cement into the weigh hopper generates emissions that may be controlled by venting the displaced air to the individual storage bins and silos or by venting it directly to a central control system.

Fugitive dust occurring from air displaced as dry materials are discharged from the weigh hopper into the mixer at a central-mix plant can be considerable. A mobile hood placed over the outlet of

the discharge end of the mixer coupled with venting to a fabric filter can accomplish effective control. When the mixer is ready to be dumped, this hydraulically operated hood is swung away from the discharge end. For a hood of this type, the indraft face velocity should be approximately 1,000-1,500 ft/min in order to adequately capture the fugitive dust.[16]

At batching plants that load transit-mix trucks, the dropping of a batch from the weigh hopper to the transit mixer can cause cement dust emissions from several points. In the loading of transit-mix trucks, a gathering hopper is usually used to control the flow of materials. Dust can be emitted from the gathering hopper, the truck-receiving hopper and the mixer. The design and location of the gathering hopper can do much to minimize dust emissions. The hopper should make a good fit with the truck-receiving hopper, and its vertical position should be adjustable. Figure 2.22-3 illustrates a design that has been successfully utilized for minimizing these dust emissions.[17] Compressed air cylinders raise and lower the gathering hopper to accommodate trucks of varying heights. A steel plate with a foam rubber backing is attached to the bottom of the gathering hopper and is lowered until it rests on the top of the truck-receiving hopper. Water for the mix is introduced through a jacket around the discharge spout of the gathering hopper and forms a dust-reducing curtain. By discharging the cement hopper into the center of the aggregate stream, and providing choke feed between the weigh hopper and the gathering hopper, dust emissions from the top of the gathering hopper can be minimized. For plants that don't have this type of gathering hopper, an enclosure or a hood vented to a baghouse and made of sheet metal which totally encloses the transit-mix truck-receiving hopper, when in place, may be used.

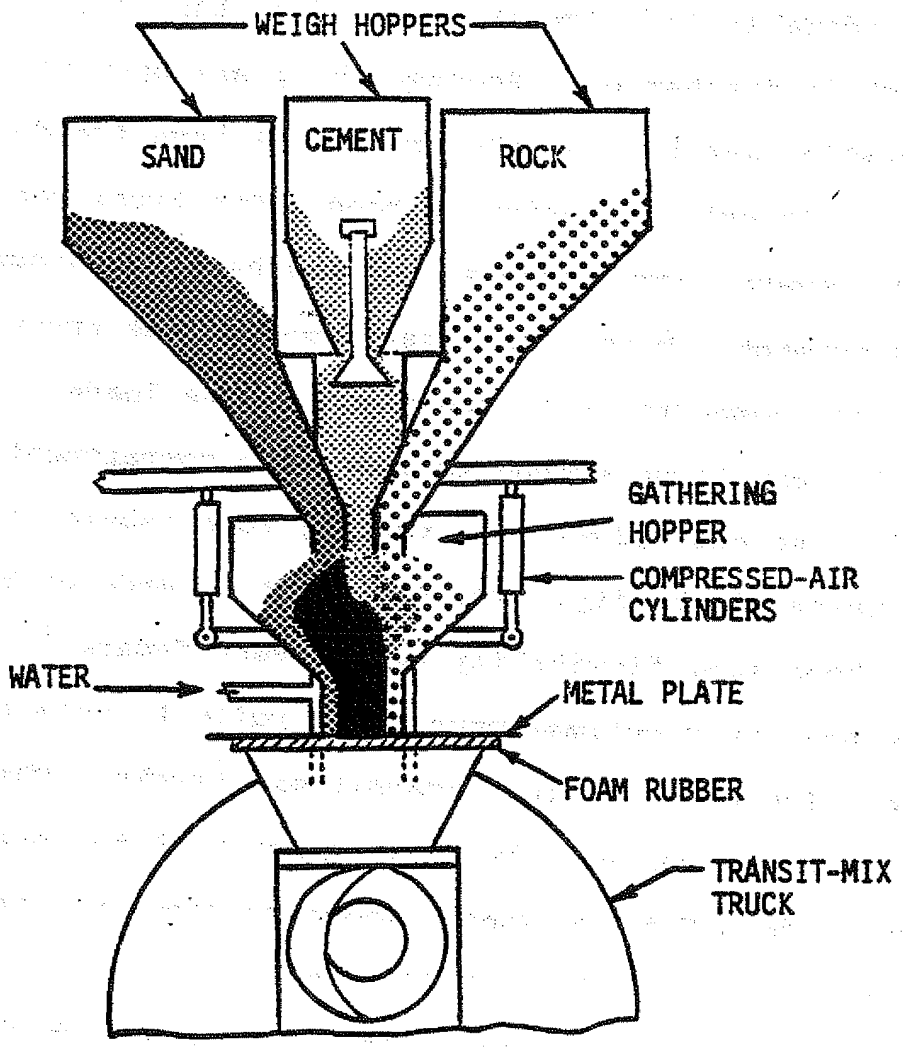

Figure 2.22-3. An adjustable gathering hopper.

Most plants that do dry-batching also do batching with transit-mix trucks; therefore, the weigh hoppers must be high enough to accommodate the transit-mix trucks. Since the receiving hopper of most transit-mix trucks is several feet higher than the top of the flat-bed trucks used to haul the materials in dry-batching, there are considerable fugitive emissions from the fall of material when a dry batch is discharged. Because the plant operator must view the operation and because the truck must have freedom of movement, this is a difficult operation to hood. The truck bed is usually divided into several compartments, and the batch is dropped into each compartment. This necessitates moving the truck after each drop so another compartment of the truck can be loaded. A canopy-type of hood, just large enough to cover one compartment at a time, provides effective dust pickup for venting to a fabric filter and affords adequate visibility. The sides can be made of heavy rubber to give the hood some flexibility and prevent damage if a truck hits it. The hood is sometimes mounted on rails to permit it to be withdrawn and allow batching into transit-mix trucks. The exhaust volume required to collect the dust varies with the shape and position of the hoods. With reasonably good hooding, the required volume is approximately 6,700 to 7,000 cfm.[18]

A conscientious housekeeping program, which includes such measures as prompt cleanup of spills, maintenance of conveying equipment to prevent leaks, and proper handling and disposal of the material collected by fabric filters, is necessary to complete the overall effective control of fugitive emissions at concrete batching plants.

Table 2.22-3 summarizes the available control techniques, their effectiveness and estimated costs, and the RACM selections.

2.22.5 Recommended Reasonably Available Control Measures (RACM)

The RACM selections for concrete batching plant fugitive sources are presented in Table 2.22-3. The recommended control for sand and aggregate stockpiling, as well as the transferring of sand and aggregate to elevated bins, is a wet dust suppression system utilizing a chemical wetting agent. This system gives good control efficiency (estimated 90%[24]) and reduces visible emissions to almost zero percent opacity.[25]

For vehicular traffic at sand and aggregate storage areas, the use of wet suppression (chemical) on unpaved storage areas is recommended. Wetting agents which are sprayed onto the material during processing or at transfer points retain their effectiveness in subsequent storage operations, because they retain surface moisture for extended periods, thereby preventing dusting.

Recommended control for cement unloading to elevated storage silos is the use of enclosures. This is feasible because most plants already control these emissions in this way.

The silo vents (pneumatic loading to silo) can be controlled either by a central control system which controls fugitive emissions from cement dust sources, such as those existing in a dry-batching plant or in a central-mix plant, or by a bank of approximately four simple bin vent filters on top of each silo. These controls are advantageous not only for their high degree of particulate control, but also for the added benefit of product recovery.

For silos which are loaded by bucket elevator, RACM is simply the use of fabric "socks". This control method is adequate for such systems because the air displaced from the silo during such loading is minimal.

Where a central collection system is not employed, the weigh hopper emissions may be controlled by venting back to the bins or silos.

TABLE 2.22-3. A SUMMARY OF THE CONTROL ALTERNATIVES, EFFICIENCIES AND COSTS, AND THE RACM SELECTIONS FOR FUGITIVE DUST EMISSIONS FROM CONCRETE BATCHING PLANTS

Fugitive dust sources	Control alternatives	Control efficiency, %	Control costs, Jan., 1980 $		Cost benefit, $/lb	RACM selection
			Capital	Annualized		
(1) Sand and aggregate storage						
Loading onto pile	Enclosure (stone ladders)	70-99[a,b]	(See Section 2.1)		NA	Wet suppression (chemical)
	Wet suppression (chemical)	80-90[b]	(See Section 2.1)		NA	
	Telescopic chutes	75[b]	(See Section 2.1)		NA	
Loading out	Wet suppression (chemical)	80-90[b]	(See Section 2.1)		NA	Wet suppression (chemical)
	Watering	50[c]	(See Section 2.1)			
	Gravity feed onto conveyor	80[b]	(See Section 2.1)		NA	
Wind erosion	Enclosure	95-99[b]	(See Section 2.1)		NA	Wet suppression (chemical)
	Wet suppression (chemical)	90[b]	(See Section 2.1)		NA	
	Watering	50[b]	(See Section 2.1)		NA	
Vehicular traffic	Enclosure	95-99[c]	(See Section 2.1)		NA	Wet suppression (chemical)
	Wet suppression (chemical)	90[c]	(See Section 2.1)		NA	(good housekeeping)
	Watering	50[c]	(See Section 2.1)		NA	
	Traveling booms to distribute material	no estimate	(See Section 2.1)		NA	
(2) Transfer of sand and aggregate to elevated bins	Enclosure, vent to fabric filter	99[b]	(See Section 2.1)		NA	Wet suppression (chemical)
	Wet suppression (chemical)	95[b]	(See Section 2.1)		NA	
	Watering	50[b]	(See Section 2.1)		NA	
(3) Cement unloading to elevated storage silos	Enclosure[a]	70[d]	860[e]	200[f]	0.13	Enclosure[a]

(continued)

TABLE 2.22-3 (continued)

Fugitive dust sources	Control alternatives	Control efficiency, %	Control costs, Jan., 1980 $		Cost benefit, $/lb	RACM selection
			Capital	Annualized		
(4) Silo vents	Vent to fabric filter[j]	99[g]	107,000[h]	16,300[f]	2.28	Vent to fabric filter[j]
	Fabric "sock"[a]	99[g]	2,300[k]	m	NA	Fabric "sock"[a]
	Vent to fabric filter[l]	99[g]	10,800[n]	3,000[f]	1.42	
	Vent filter[o]	99[g]	5,200[p]	1,500[n]	0.73	Vent filter[o]
(5) Weigh hopper loading of cement, sand, and aggregate	Vent back to bins or silos	95[g]	m	m	NA	Vent back to bins or silos[t]
	Vent to fabric filter	99[g]	q	q	2.28	Vent to fabric filter[j]
(6) Mixer loading of cement, sand, and aggregate (central-mix plant)	Mobile hood, vent to fabric filter	99[g]	q	q	2.28	Mobile hood, vent to fabric filter
(7) Loading of transit-mix truck (batching)	Enclosure	70-99[r]	4,000 to 22,000[f]	m	NA	Enclosure[s]
	Choke feed	90[g]	m	m	NA	
(8) Loading of flat-bed truck (dry-batch)	Canopy-type hood, vent to fabric filter	99[g]	107,000[h]	16,300[f]	2.28	Canopy-type hood, vent to fabric filter[u]

[a] For bucket elevators.

[b] Reference 21. p. 3-6.

[c] Reference 26.

[d] "Weather-tight" system; no active dust collection system.

[e] Based on a 200 ft. conveyor with an enclosure cost of $43/ft. Reference 19. p. 6-3.

[f] Assuming annual cost of approximately 20% of the capital costs.

[g] Engineering judgment.

[h] Reference 20. Based on 10,000 acfm. One system to control emissions from sources 4, 5, 6, & 8.

(continued)

TABLE 2.22-3 (continued)

[i]Reference 20. Based on 2,000 hr/yr operation producing 89,000 tons/yr.

[j]Part of central collection system to control sources 4, 5, 6, & 8 at central mix plants.

[k]Reference 27.

[l]Applicable for plants with pneumatic delivery and no central collection system. Baghouse equipped with mechanical shaking device and blower.

[m]Costs not available.

[n]Reference 22.

[o]Applicable for plants with pneumatic delivery and not utilizing a central collection system. (Bank of approximately 4 simple filtered vents atop the silo).

[p]Reference 22 and 23.

[q]Costs included within those for source 4. One central collection system to control emissions from sources 4, 5, 6, & 8.

[r]Low value, simple enclosure; high value, enclosure plus bag filter.

[s]If an adjustable gathering hopper (choke feed) is not currently being utilized. For plants using such hopper and choke feed, no additional control is required.

[t]Applicable for plants not utilizing a central collection system.

[u]Part of central collection system to control sources 4, 5, & 6.

For mixer loading of cement, sand and aggregate at central-mix plants, RACM is the use of a mobile hood with exhaust to a central fabric filter.

The emissions occurring during the loading of the transit-mix trucks (batching) can be controlled by either enclosure or by choke feeding through the use of an adjustable gathering hopper, whichever is more economically feasible for each specific plant affected.

The use of canopy-type hoods with ventilation to a fabric filter is recommended for the loading of flat-bed trucks at dry-batching plants.

REFERENCES FOR SECTION 2.22

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11. Op. cit. Reference 5. p. 335.

12. Op. cit. Reference 2. p. 2-318.

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23. Personal Communication between Bob Moran, Wheelabrator-Frye, and James A. Cummings, Ohio EPA. Jan. 1980.

24. Op. cit. Reference 2. p. 3-15.

25. Ibid. p. 3-39.

26. Ibid. p. 2-38.

27. Personal Communication between Paul Norris, Kramer-Norris Equipment Company, and James A. Cummings, Ohio EPA. Jan. 1980.

A Typical Concrete Batch Plant Has The Following Data:

89,000 T/yr concrete produced
2,000 hr/yr

Raw material quantities were calculated on the basis of the following percentages (by weight) of the concrete produced:

sand & aggregate	85%
cement	10%
water	5%

Sources

① ② Covered in PEDCo's Write-up In Section 2.1, General Fugitive Dust Sources.

③ From PEDCo's Write-up On Material Handling In Section 2.1.

$$C/B = \frac{\$200}{(0.24\ lb/T)\ (89{,}000\ T/yr)\ (.10)\ (.70)} = \$0.13/lb\ TSP\ Removed$$

④ Central Collection System - For Sources 4, 5, 6, & 8.

		cfm thru duct	filter velocity
(A)	Bin & Silo Vents	700	3 fpm
(B)	Weigh Hopper	32	3 fpm
(C)	Mixer	2500	3 fpm
(D)	Flat-bed Truck Loading	6500	3 fpm
	Total = 9732 = 10,000 acfm		

Ac = Area of Cloth

$$3\ fpm = \frac{10{,}000\ acfm}{Ac}$$

$Ac = 3{,}333\ ft^2$

[REF. 22] Baghouse Price (Fig. 4-7) $[2910 + 1.6\ (3333)]\ \frac{(249.6)}{(192.1)} = .\$10{,}710$

Costs of Bags (Tables 4-1, 4-2) $3333\ ft^2 \times 2 \times \$.40/ft^2 = \$2666.4$

$\frac{(249.6)}{(192.1)} = ... 3{,}465$

(D) Rectangular Hood (8' x 2.4') & Supports Costs (Fig. 4-17) [L/W Ratio = 4] Plate Area Requirement $1 + 0.615(8)^2 = 40\ ft^2$

(Fig. 4-19) Labor Cost 150

$40\ ft^2 \times 5.625\ lb/ft^2 \times 1.2 = 270$ lbs.

(p. 4-25) Hood Cost LG + \$.208/lb (8)(4) + (.208)(270) ≈ \$90

$\frac{(249.6)}{(192.1)}$ = .. 120

(Fig. 4-21) Ductwork Cost 100 ft x \$50/ft = \$5,000 $\frac{(249.6)}{(192.1)}$ 6,500

(C) Circular Hood (50° θ) + Supports Cost

(Fig. 4-18) Plate Area Requirement $1.343 \times \frac{(40)^2}{(12)} = 165.8\ ft^2$

(165.8)(5.625)(112) = 1119 lbs.

(Fig. 4-20) Labor Cost 350

(p. 4-25) Hood Cost (165.8)(\$.90/ft^2) + (\$.108)(1119) =

\$270 $\frac{(249.6)}{(198.1)}$ ≈ \$350

plus, Hydraulics for Swing-away (≈\$1,000) \$1,000 +

\$350 = ... 1,350

(Fig. 4-21) Ductwork Cost 100 ft x \$50/ft = \$5,000 $\frac{(249.6)}{(192.1)}$ ≈ 6,500

(A) & (B) (Fig. 4-21) Ductwork Cost (50'+50' = 100') 100 ft x $25/ft = $2500 $\frac{(249.6)}{(192.1)}$ = ... $3,250

(Fig. 4-24) Elbow Ducts (4) ($850)+($850)+($350) = $2400 $\frac{(249.6)}{(192.1)}$ = ... 3,120

(Fig. 4-26) Expansion Joints (4) ($2375)+(2375)+($1625) = $8000 $\frac{(249.6)}{(192.1)}$ = ... 10,400

(Fig. 4-40) Fans (23", Class II, Backwardly Curved, 4" ΔP) 1200 rpm, 8 bhp $1600 $\frac{(249.6)}{(192.1)}$ = ... 2,079

(Table 4-5) Motor 68 + 18(8) = $212 $\frac{(249.6)}{(192.1)}$ = 275

(Table 4-5) Mag. Starter 150 + 2.5(8) - .00005(8^3) $173 $\frac{(249.6)}{(192.1)}$ = ... 225

Total Cost =..... $48,494

④ Central Collection System Capital Costs

1)	Equipment Costs (control device + aux.'s)	=	$48,494
2)	Tax & Freight (7% of 1)	=	3,395
3)	Installation Costs (75% of 1)	=	36,371
4)	Subtotal (1 + 2 + 3)	=	88,260
5)	Engineering (10% of 4)	=	8,826
6)	Subtotal (4 + 5)	=	97,086
7)	Contingencies (10% of 6)	=	970
8)	Total Capital Costs (6 + 7)	=	$106,795

Annualized Costs

Capital Charges $R \cdot PV = PV$ /n=30 i=12%

$R \cdot (8.055) = \$106,795$

$R = \$13,258$

Operating Costs (Fig. 46) ($.35/hr)(2,000 hr/yr) = $700

$\frac{(249.6)}{(192.1)}$ = $910

Maintenance (Table 4-12) $2136

Total Annual Costs = $13,258 + $910 + $2,136 = $16,304

C/B (Central mix plants, sources 4, 5, & 6) $= \frac{\$16,304}{[(89,000)(.10)(.24)+(89,000)(.95)(.02) + (89,000)(.95)(.04)](.99)}$

C/B = $2.28/lb TSP removed

C/B (Dry-batching, Sources 4, 5, & 8) $= \frac{\$16,304}{[(89,000)(.10)(.24)+(89,000)(.95)(.02) + (89,000)(.95)(.04)](.99)}$

C/B = $2.28/lb TSP removed

Silo Vent Emissions

Cement Elevator . . . . Pneumatic Delivery

Silo Capacity = 250 ft^3

Filter Velocity = 3 fpm

Cloth Area = 200 ft^2

Air Flow Rate = 350 cfm during most of loading cycle, increasing to 700 cfm at end of cycle.

Control Device: Baghouse equipped with blower to relieve pressure built up within the silo, and a mechanical shaking mechanism.

Capital Costs

[Ref. 22]	Baghouse	$4,197
	Fabric	208
	Fan w/motor	892
	Equipment	5,297
	Tax, freight (7%)	371
	Maintenance (2%)	106
	Install (75%)	3,973
	Subtotal	9,747
	Engr. (10%)	975
	Subtotal	10,722
	Contingency (10%)	107

Total Capital Investment = $10,829 (Jan.'80) = $10,800

Annual Costs

Operating Costs ($0.35)(2,000 hrs/yr) = $700 $\frac{(249.6)}{(192.1)}$ = $910

Maintenance (2%)(10,800) = $216

Capital Charges PV = R · PV/ n = 10 i = 12%

(5.650) R = $10,800

R = $1,912

Total Annual Costs = $216 + $910 + $1,912 = $3,000

$$C/B = \frac{\$3,000}{(0.24\ lb/T)(89,000\ T/yr)(.10)(.99)}$$

C/B = $1.42/lb TSP removed

Silo Vent Emissions

[Ref. 5] Cement Elevator .... Pneumatic Delivery
Filter Velocity 7 fpm
Cloth Area ≈ 100 ft^2
Air Flow Rate = 700 cfm
Control Device: Bank of approximately 4 simple filtered vents atop the silo; should provide shaking mechanism to prevent blinding of cloth.

[Ref. 23] Collector with shaker ≈ $2/cfm (collector sizing):

700 cfm x 2 (2 to 1) = 1400 cfm x $2.00 = $2800 (Jan. '80)

Bags: [Table 4-2] (2)(100) = 200
(200)($.40) = $80 $\frac{(249.6)}{(192.1)}$ = $104
$2800 + $104 = $2,904

Capital Costs

1.	Equipment Costs (control device & aux.'s)	=	$2,904
2.	Tax & Freight (7% of 1)	=	203
3.	Installation Costs (40% of 1)	=	1,162
4.	Subtotal (1 + 2 + 3)	=	4,269
5.	Engineering (10% of 4)	=	427
6.	Subtotal (4 + 5)	=	4,696
7.	Contingencies (10% of 6)	=	470
8.	Total Capital Costs	=	$5,166

Annualized Costs

Operating Costs [Fig. 4-60] ($0.25)(2,000 hrs/yr) = $400
$\frac{(249.6)}{(192.1)}$ = $520

Maintenance [Table 4-12]: $103
Capital Charges PV = R · PV/n = 10 i = 12%
(5.650) R = $5,166
R = $ 914
Total Annual Costs = $520 + $103 + $914 = $1,537

$$C/B = \frac{\$1,537}{(0.24\ lb/T)(89,000\ T/y)(.10)(.99)}$$

$$C/B = \frac{\$1,537}{2,114.6\ lb/yr}$$

C/B = $.73/lb TSP Removed

APPENDIX FOR SECTION 2.22

A Typical Concrete Batch Plant Has The Following Data:

390,000 T/yr
2,000 hr/yr

Sources

①② Covered In PEDCo's Write-up In Section 2.1, General Fugitive Dust Sources.

③ From PEDCo's Write-up On Material Handling In Section 2.1.

④ Central Collection System - For Sources 4 , 5 , 6 , & 8 .

		cfm thru duct	filter velocity	Ac = Area Of Cloth
(A)	Bin & Silo Vents	700	3 fpm	
(B)	Weigh Hopper	32	3 fpm	3 fpm = $\frac{10{,}000 \text{ acfm}}{Ac}$
(C)	Mixer	2500	3 fpm	
(D)	Flat-bed Truck Loading	6500	3 fpm	Ac = 3,333 ft^2

Total = 9732 ∿ 10,000 acfm

[REF.20] Baghouse Price (Fig. 4-7) [2910 + 1.6(3333)] $\frac{(249.6)}{(192.1)}$ = . .$10,710

Costs Of Bags (Tables 4-1, 4-2) 3333 ft^2 x 2 x \$.40/ft^2 = \$2666.4 $\frac{(249.6)}{(192.1)}$ = ... 3,465

(D) Rectangular Hood (8'x2.4') & Supports Costs
(Fig. 4-17) [L/W Ratio = 4] Plate Area Requirement $1 + 0.615(8)^2 = 40 \text{ ft}^2$

(Fig. 4-19) Labor Cost 150
40 ft^2 x 5.625 lb/ft^2 x 1.2 = 270 lbs.

(p. 4-25) Hood Cost LG + \$.208/lb (8)(\$4)+(.208)(270)≈\$90 $\frac{(249.6)}{(192.1)}$ = . . 120

(Fig. 4-21) Ductwork Cost 100 ft x \$50/ft = \$5000 $\frac{(249.6)}{(192.1)}$ = 6,500

(C) Circular Hood (50°θ) + Supports Cost
(Fig. 4-18) Plate Area Requirement $1.343 \times \frac{(40)^2}{(12)} = 165.8 \text{ ft}^2$

(165.8)(5.625)(112) = 1119 lbs.

(Fig. 4-20) Labor Cost 350

(p.4-25) Hood Cost (165.8)(\$.90/ft^2)+(\$.108)(1119) = \$270 $\frac{(249.6)}{(198.1)}$ ≈ \$350

plus, Hydraulics for Swing-away (∿\$1,000) \$1,000 + \$350 = ... 1,350

(Fig. 4-21) Ductwork Cost 100ft x \$50/ft = \$5,000 $\frac{(249.6)}{(192.1)}$ ≈ 6,500

(A)&(B) (Fig. 4-21) Ductwork Cost (50'+50'=100') 100 ft x $25/ft = $2500 $\frac{(249.6)}{(192.1)}$ ≈ . . . . . $ 3,250

(Fig. 4-24) Elbow Ducts (4) ($850)+($850)+($350) = $2400 $\frac{(249.6)}{(192.1)}$ ≈ 3,120

(Fig. 4-26) Expansion Joints (4) ($2375)+(2375)+($1625) = $8000 $\frac{(249.6)}{(192.1)}$ ≈ 10,400

(Fig. 4-40) Fans (23", Class II, Backwardly Curved, 4" ΔP) 1200 rpm, 8 bhp $1600 $\frac{(249.6)}{(192.1)}$ = . . . 2,079

(Table 4-5) Motor 68 + 18(8) = $212 $\frac{(249.6)}{(192.1)}$ = 275

(Table 4-5) Mag. Starter 150 + 2.5(8) - .00005(8^3) $173 $\frac{(249.6)}{(192.1)}$ = ... 225

Total Cost = ... $48,494

④ Central Collection System Capital Costs

1)	Equipment Costs (control device + aux.'s)	=	$48,494
2)	Tax & Freight (7% of 1)	=	3,395
3)	Installation Costs (75% of 1)	=	36,371
4)	Subtotal (1 + 2 + 3)	=	88,260
5)	Engineering (10% of 4)	=	8,826
6)	Subtotal (4 + 5)	=	97,086
7)	Contingencies (10% of 6)	=	970
8)	Total Capital Costs (6 + 7)	=	$106,795

Annualized Costs

Capital Charges $R \cdot PV = PV / n=30 \quad i=12\%$

$R \cdot (8.055) = \$106,795$

$R = \$13,258$

Operating Costs (Fig. 46) ($.35/hr)(2,000 hr/yr) = $700

$\frac{(249.6)}{(192.1)}$ = $910

Maintenance (Table 4-12) $2136

Total Annual Costs = $13,258 + $910 + $2,136 = $16,304

$$C/B = \frac{\$16,304}{[(0.24\ lb/T)(390,000\ T/yr)+(0.02\ lb/T)(390,000\ T/yr)+(0.04\ lb/T)(390,000\ T/yr)+(0.04\ lb/T)(390,000\ T/yr)].99}$$

$$C/B = \frac{\$16,304}{132,600\ lb/yr}$$

C/B = $0.12/lb TSP Removed

Silo Vent Emissions

Cement Elevator . . . . Pneumatic Delivery

Silo Capacity = 250 ft^3

Filter Velocity = 3 fpm

Cloth Area = 200 ft^2

Air Flow Rate = 350 cfm during most of loading cycle, increasing to 700 cfm at end of cycle.

Control Device: Baghouse equipped with blower to relieve pressure built up within the silo, and a mechanical shaking mechanism.

Capital Costs

[Ref. 22]	Baghouse	$4,197
	Fabric	208
	Fan w/motor	892
	Equipment	5,297
	Tax, freight (7%)	371
	Maintenance (2%)	106
	Install (75%)	3,973
	Subtotal	9,747
	Engr. (10%)	975
	Subtotal	10,722
	Contingency (10%)	107

Total Capital Investment = $10,829 (Jan.'80) ≈ $10,800

Annual Costs

Operating Costs ($0.35)(2,000 hrs/yr) = $700 $\frac{(249.6)}{(192.1)}$ ≈ $910

Maintenance (2%)(10,800) = $216

Capital Charges PV = R · PV/ n = 10 i = 12%
(5.650) R = $10,800
R = $1,912

Total Annual Costs = $216 + $910 + $1,912 ≈ $3,000

$$C/B = \frac{\$3,000}{(0.24\ lb/T)(390,000\ T/yr)(.99)}$$

C/B = $0.03/lb TSP removed

2.7 IRON FOUNDRIES

2.7.1 Process Description[1-7]

Foundries produce castings for automotive parts, light and heavy machinery, pipe and a wide range of miscellaneous products. The process involves melting scrap metal and/or pig iron (crude iron in the form of blocks weighing about 100 pounds) and pouring the molten metal into prepared molds. The two major categories are "iron" foundries and "steel" foundries. Iron foundries may be further subdivided into "gray iron", "malleable iron" and "ductile iron" foundries. Both iron and steel consist primarily of elemental iron but with differing carbon content. Iron contains 2 to 4 percent carbon, and steel contains 1 percent or less. Iron formulations also incorporate various amounts of other elements. For example, silicon content is generally in the range of 2 to 3 percent in iron formulations.[8] Steel may also contain alloying elements.

Iron foundries may be further classified as either "captive" or "jobbing" foundries. A captive foundry is one that is a regular operating element of a manufacturing establishment and whose castings are generally made for the products of the parent company. In contrast, a jobbing foundry is one that manufactures a variety of castings which are not used in its own products, but are made for the products of other companies.

Figures 2.7-1 and 2.7-2 illustrate the process flow in a typical iron foundry. The basic process flow is essentially the same regardless of whether the foundry is captive or job shop. About 70 percent of the iron melted in the U.S. is produced in a cupola furnace.[9] Cupola capacities range from 1 to 100 tons of molten metal per hour. Over 60 percent operate in the range of 3 to 11 tons per hour. (Figure 2.7-3 illustrates a typical cupola furnace.) The other types of furnaces used in iron foundries are

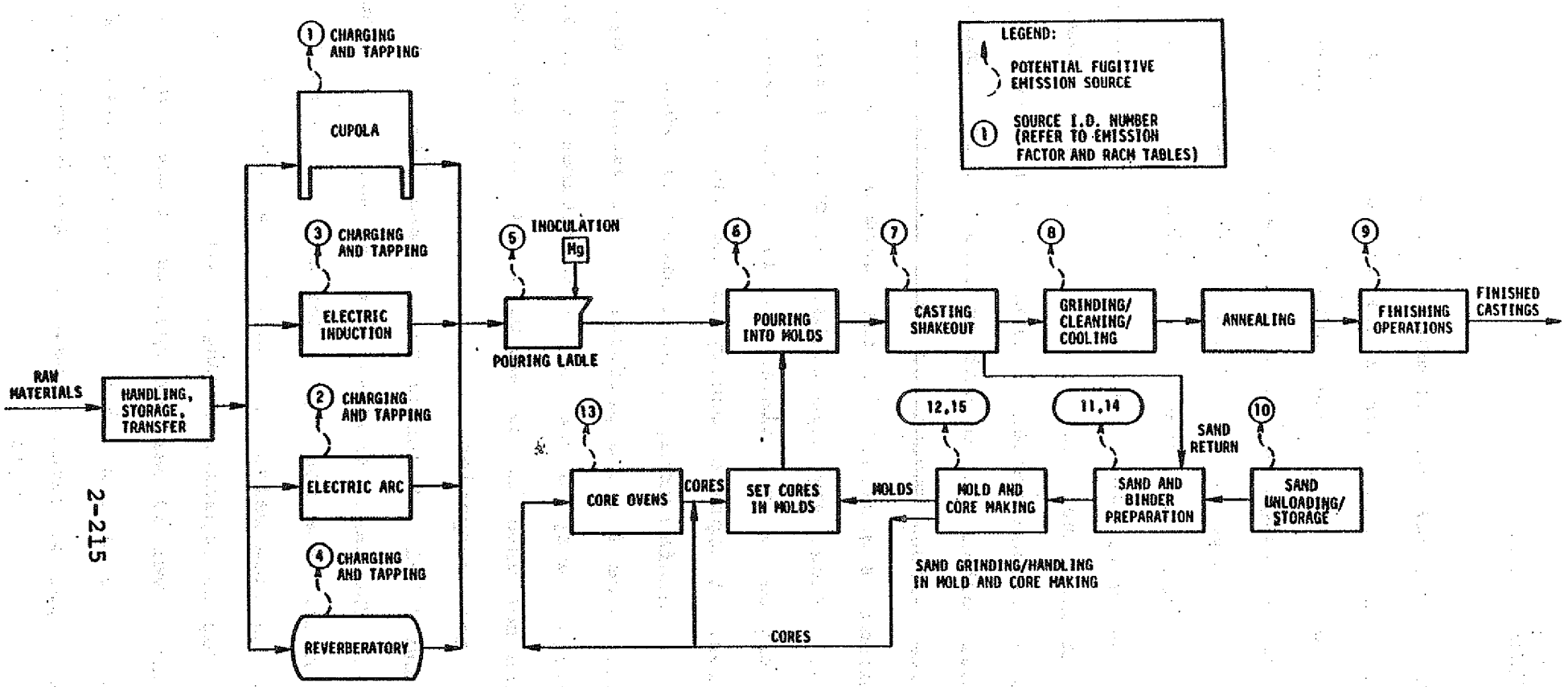

Figure 2.7-1. Simplified process flow diagram for iron foundries and associated fugitive particulate emission sources.

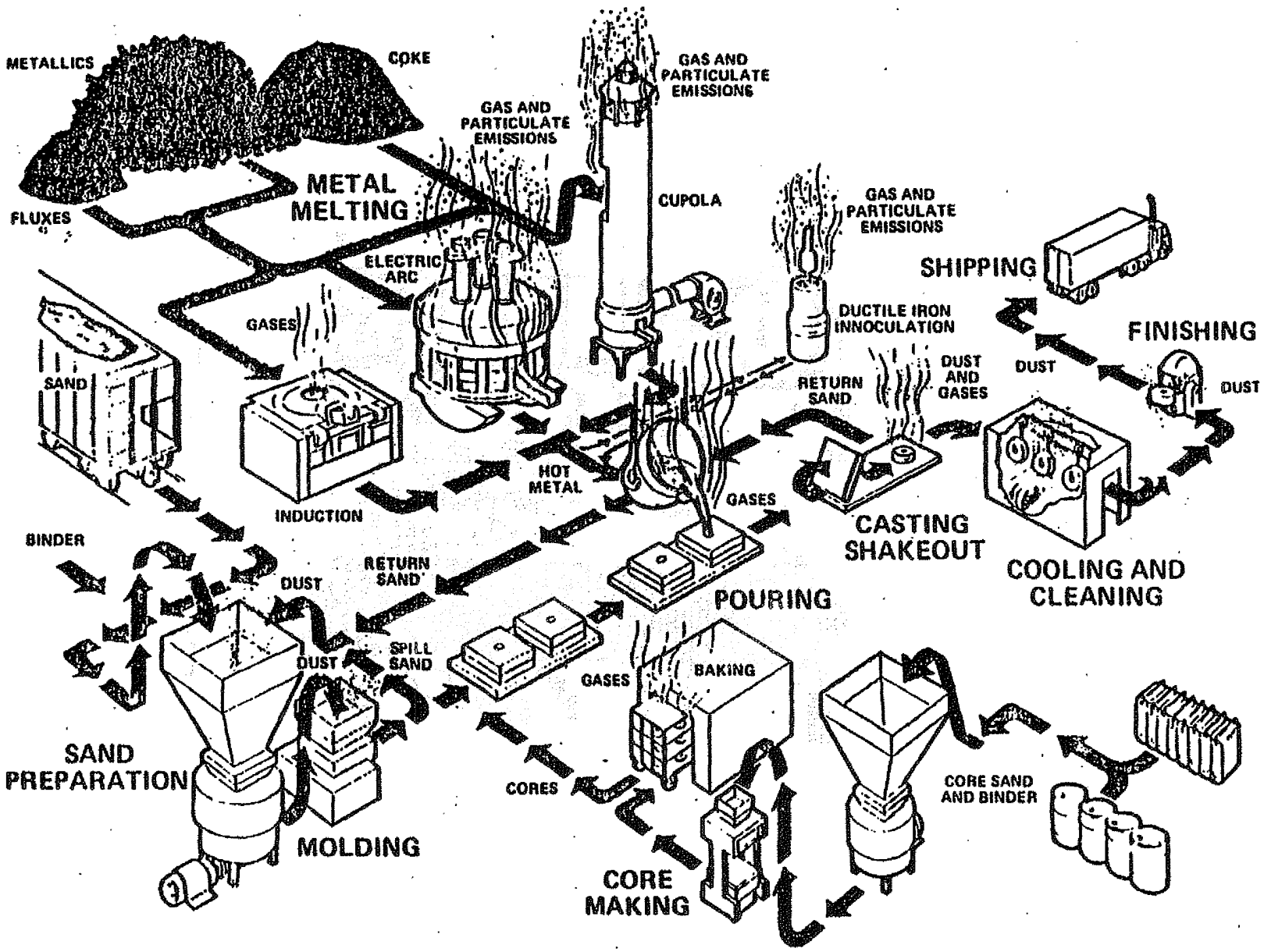

Figure 2.7-2. Iron foundry process flow diagram.[10]

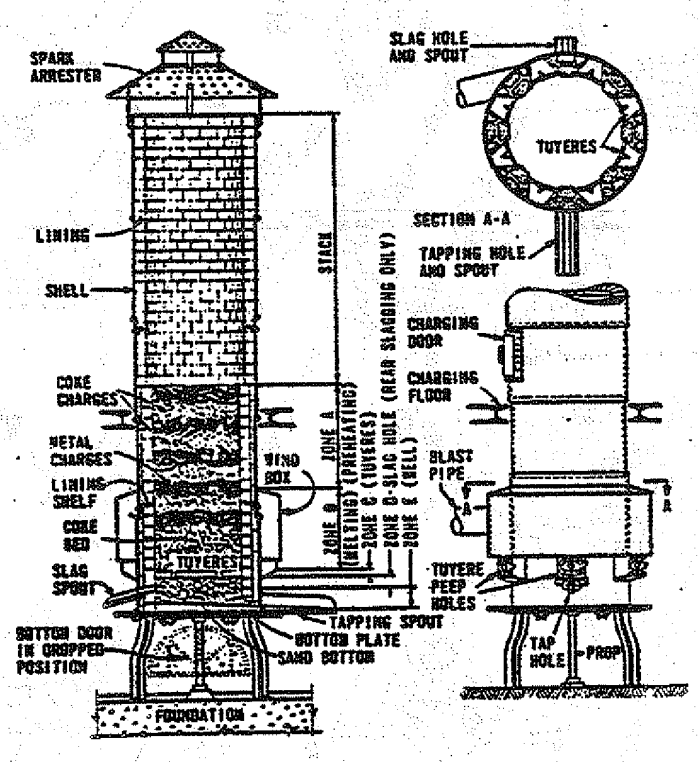

Figure 2.7-3. Cupola furnace.[11]

electric arc, electric induction and reverberatory. (These furnaces are shown in Figures 2.7-4 to 2.7-7.)

Raw materials are charged into the cupola through a door in the top of the furnace. The raw materials consist of iron and/or steel scrap, pig iron, flux materials, ferrosilicon and coke. Fluxes are limestone or similar minerals, that absorb impurities after the charge has melted. Coke is essentially pure carbon in lump form. The burning of the coke provides the heat to melt the raw materials. As the charge melts, it descends to the bottom of the furnace where the molten metal product is drained out periodically. Fresh raw materials are added to keep the furnace full. Operation of cupola furnaces can be done on a continuous basis.

The charge for electic arc, electric induction and reverberatory furnaces consists mainly of iron and/or steel scrap, pig iron and limestone. The reverberatory furnace is heated by firing gas or oil. These furnaces are operated on a batch basis.

The molten metal is tapped from the furnace at a temperature of about 2900°F into a ladle or into a holding furnace until it is ready to be drained into a ladle. The ladle is transported to the mold line, and molten metal is poured into prepared molds. The molds contain the molten iron within the mold form until it solidifies. In production of high strength ("ductile iron") castings, magnesium is added to the molten iron by a process called inoculation. (See Figure 2.7-8 for an illustration of the magnesium treatment methods used to produce ductile iron.) After solidification, the sand molds and castings are separated, and the sand is recycled to the mold making operation. Castings are shaken out of the molds, or the molds are broken away from the castings. When sufficiently

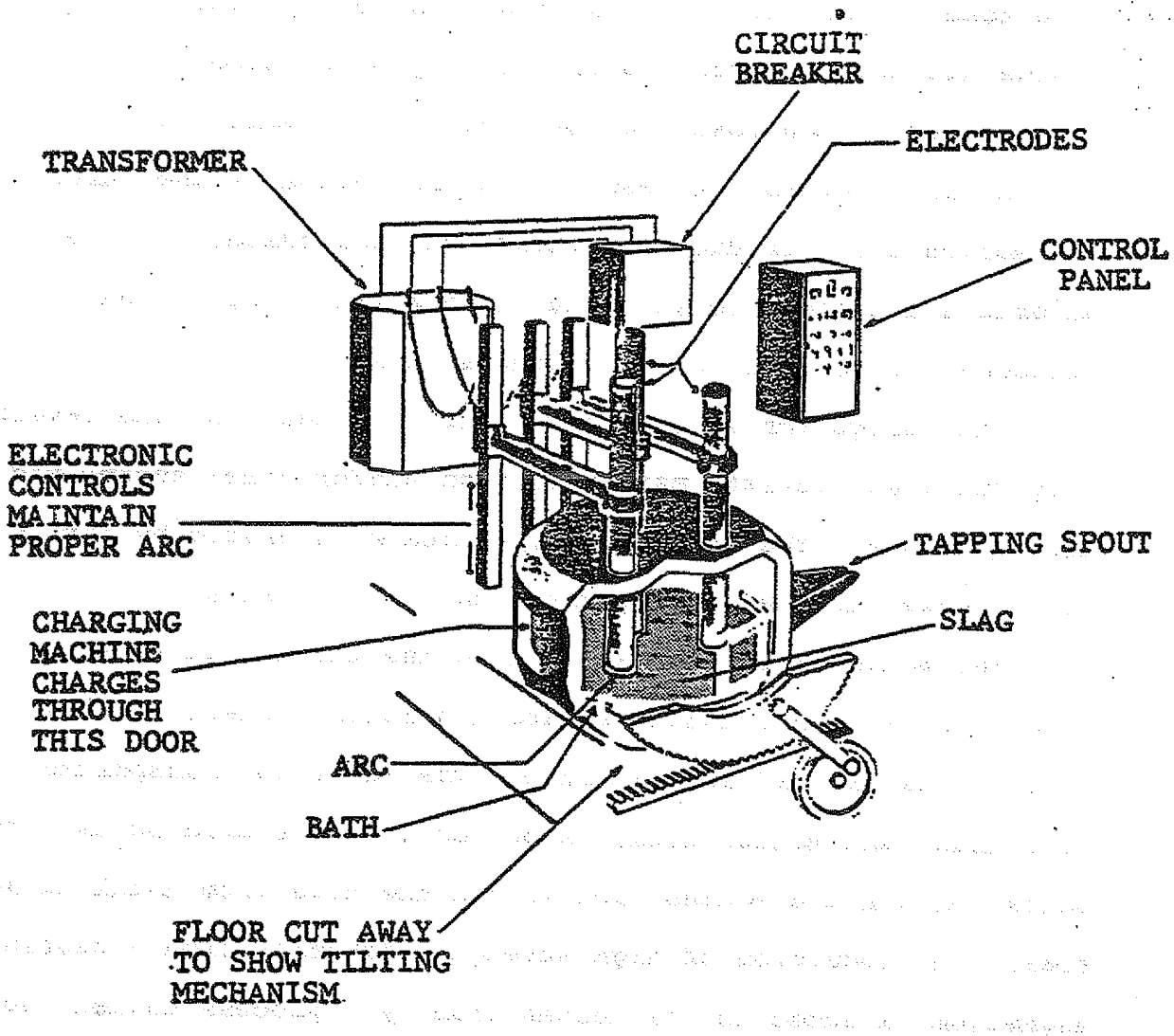

Figure 2.7-4. Electric arc furnace.[12]

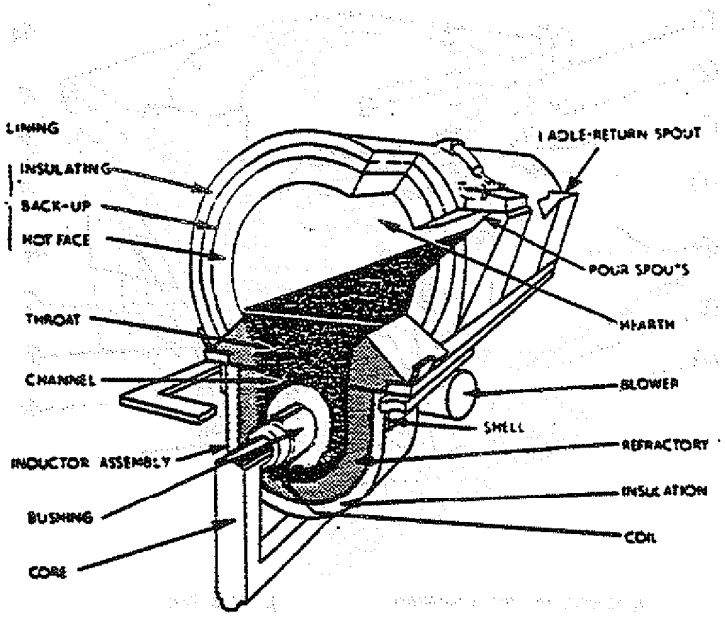

Figure 2.7-5. Channel electric induction furnace.[13]

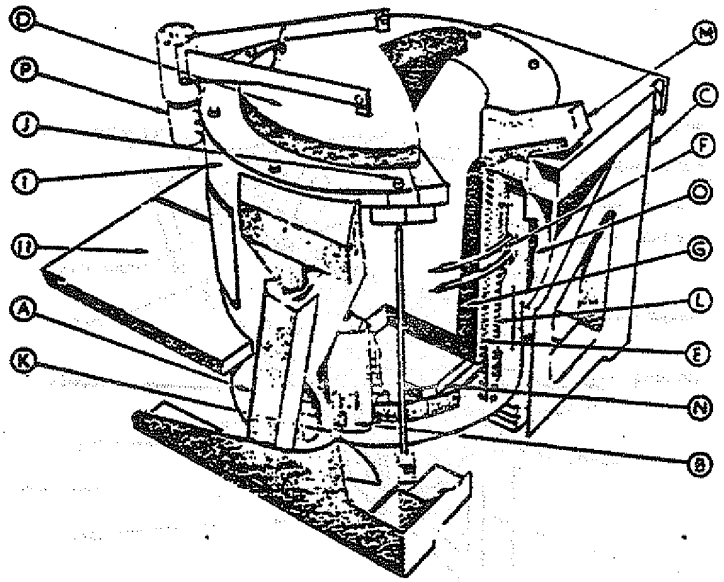

Figure 2.7-6. Coreless electric induction furnace.[14]

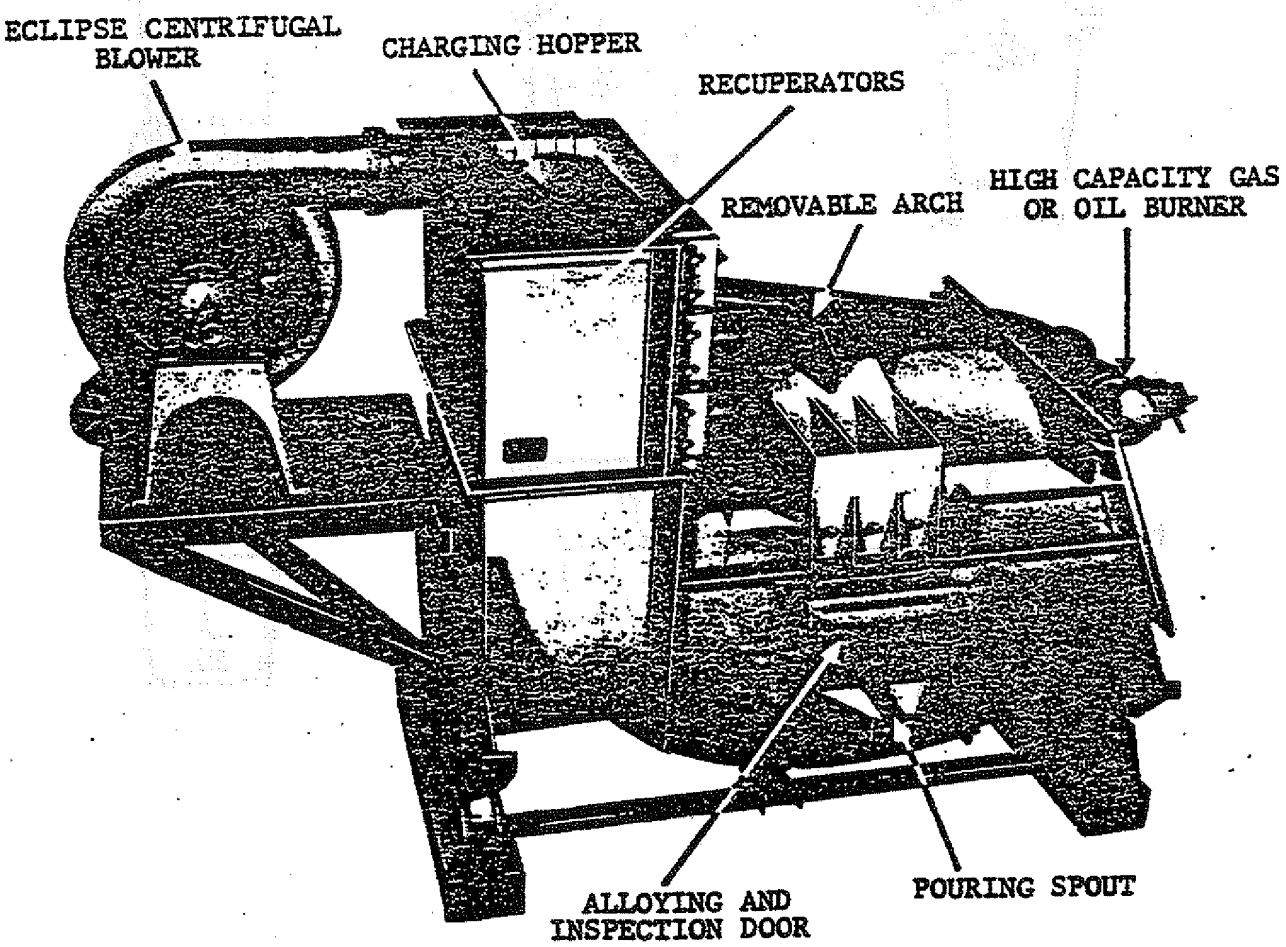

Figure 2.7-7. Reverberatory furnace.[15]

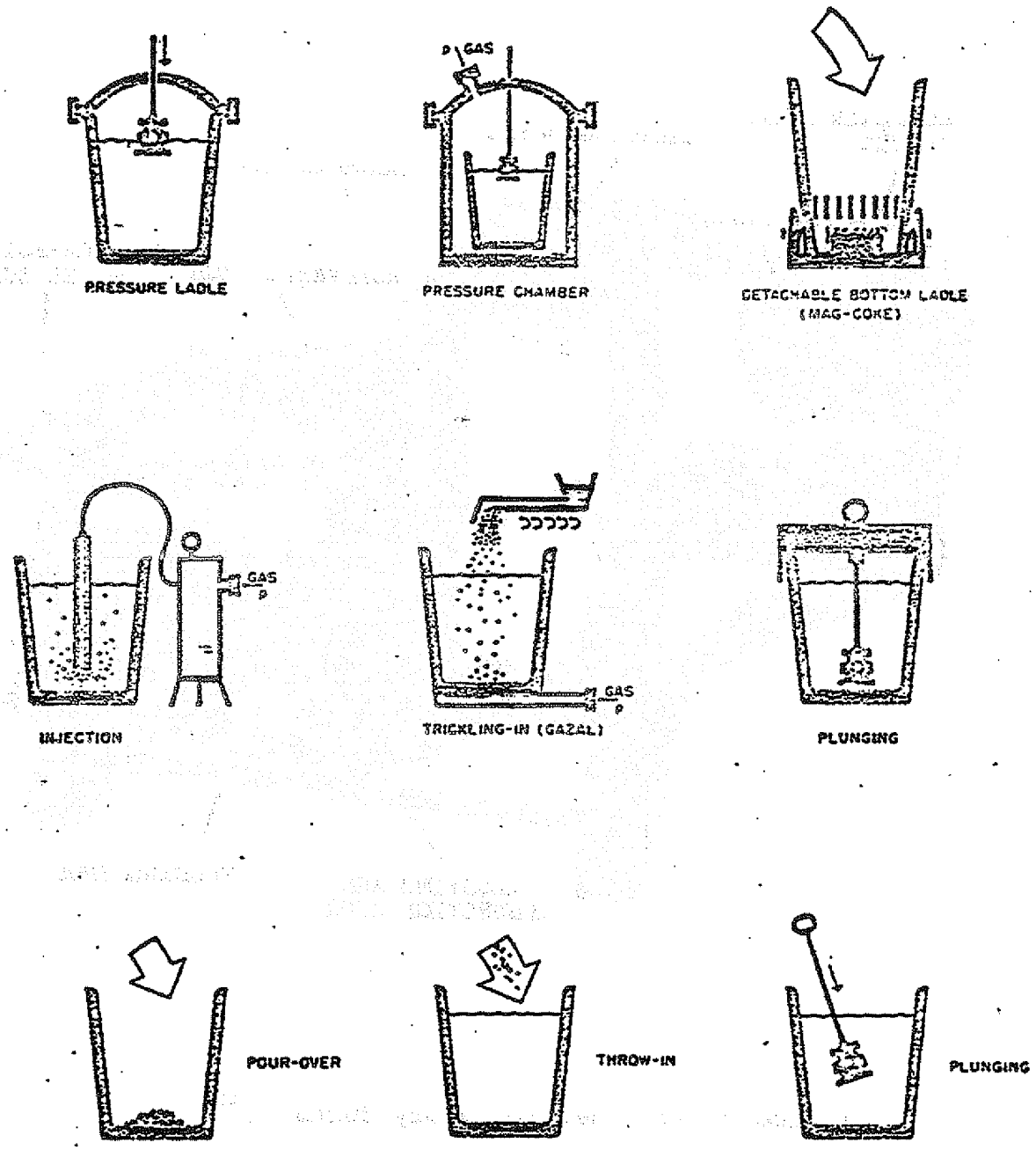

Figure 2.7-8. Magnesium treatment methods for producing ductile iron.[16]

cool, the castings are cleaned by shot blasting, and the remaining excess metal (gates, sprue, risers, flash, etc.) is removed by sawing, grinding, chipping, cutting, etc. These processes are generally housed in an enclosure.

Castings intended for certain uses may be annealed (heat treated) for several hours at temperatures of 1000 to 1600°F. Heat treating furnaces, fired by gas, oil or electricity, are referred to by such names as "annealing", "hardening", "car-bottom" and "traveling hearth" furnaces. Castings that have been annealed in the present of sufficient silicon are referred to as malleable iron castings. Some ductile iron castings, which are produced by inoculating the melt with a small amount of magnesium just prior to casting, are also often subjected to annealing. Finishing operations such as shot or sand blasting, grinding and surface coating may follow the heat treatment.

Production of molds and cores is an integral part of the foundry operation. A mold is made of sand mixed in a muller (see Figure 2.7-9) with water and binders, such as clay or resins. Pitch is sometimes added to the mold mixture primarily to prevent surface defects on the castings. A core is a separable part of the mold used to form a cavity in the casting. Cores are also made of sand and binders. Cores may be produced by any one of a number of processes including hot box, cold box, air set, shell and oil-sand methods.[17] In the oil-sand process, after the cores are formed in the desired shape, they are cured either in a baking oven (core oven) at 300-500°F or at room temperature. Curing evaporates moisture and hardens the sand mixture. Core ovens are fired with gas or oil.

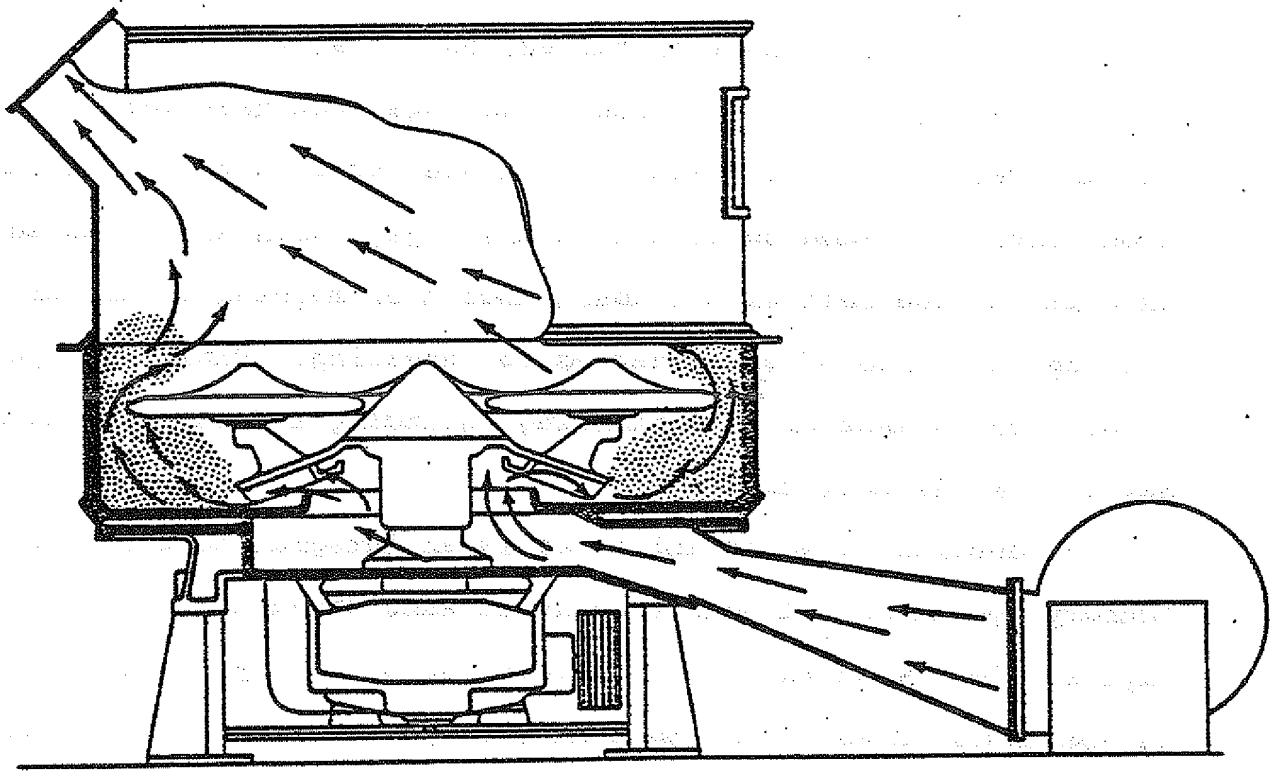

Figure 2.7-9. Sand muller.[18]

The potential sources of fugitive emissions in iron foundries include raw material receiving, storage and handling, melting furnace charging and tapping, iron inoculation, molten iron transporting and pouring, casting, shakeout, cooling, cleaning and finishing, and core and mold making. Each of these sources is identified in Figures 2.7-1 and 2.7-2.

2.7.2 Fugitive Dust Emission Factors

The estimated emission factors for iron foundry fugitive particulate sources are summarized in Table 2.7-1. Most of these emissions factors are based on "engineering judgment" (source's terminology) and very sparse test data. They should be considered of poor reliability. Emission factors were not included for coke handling and storage at iron foundries. These factors are discussed in Section 2.2.2-2. Factors are also not included for raw material handling, storage and transfer operations due to a lack of data. These sources are deemed to be insignificant as far as steel/iron scrap is concerned.

The emission factors for charging and tapping of the various furnace types, with the exception of electric induction furnaces, were derived by assuming a percentage of total furnace emissions. The emission factor for electric induction furnaces represents total furnace emissions including charging and tapping emissions. No test data were available; and, therefore, these factors are unconfirmed and have a very poor reliability rating.

The other emission factors are based upon very sparse test data and the source's engineering judgment. The reliability rating for these factors is also very poor.

TABLE 2.7-1. FUGITIVE DUST EMISSION FACTORS FOR IRON FOUNDRIES

	Source	Emission factor	Reliability Rating	Reference
1	Cupola furnace charging and tapping	0.1 to 2.0 lb/ton iron produced	E	1
2	Electric arc furnace charging and tapping	0.7 lb/ton iron charged[a] 1.4 lbs/ton iron charged[b]	E	19
3	Electric induction furnace melting, charging and tapping	1.5 lb/ton iron produced	E	1
4	Reverberatory furnace charging and tapping	0.1 lb/ton iron produced	E	3
5	Ductile iron inoculation	3.3 to 4.5 lb/ton iron produced	D	4,5
6	Pouring molten metal into molds	0.1 to 4.13 lb/ton iron produced	D	4,6
7	Casting shakeout	1.2 to 12.8 lb/ton iron produced	E	4,7
8	Cooling and cleaning castings	0.16 to 0.8 lb/ton castings produced	D	4,7
9	Finishing castings	0.01 lb/ton castings produced	E	7
10	Core and mold sand unloading and storage: mechanical handling pneumatic handling	 0.03 lb/ton sand unloaded[c] NA	 E	 20
11	Core sand and binder mixing	0.3 lb/ton sand mixed or 0.75 to 8.24 lb/ton iron produced	E E	2 4,7
12	Core making	0.35 lb/ton cores produced	E	2
13	Core baking	0.03 to 5.4 lb/ton cores baked	E	7,9,20
14	Mold sand preparation	1.3 lb/ton castings produced	E	4
15	Mold making	0.04 lb/ton castings produced	E	7

NA = Not available
[a]With no alloying in the ladle.
[b]With alloying in the ladle.
[c]Sand unloading emission factor is assumed to be equivalent to the taconite pellets unloading emission factor as presented in Section 2.1.3. Fugitive dust emissions from storage are estimated to be negligible since sand is normally stored indoors.

2.7.2 Particle Characterization[21]

The composition and particle size of dusts from various foundry operations will vary considerably. For example, dusts from a casting shakeout are mostly very fine carbonaceous material. On the other hand, dust from the grinding of castings contains coarse, freshly fractured particles, along with elemental iron, iron oxide and sand particles. Table 2.7-2 indicates the characteristics and sources of emissions in various foundry operations.

Much of the information available on particle characteristics is for the stack (non-fugitive) emissions from cupola and electric arc furnaces. However, since such information may be of value in approximating the particle characteristics of fugitive dust emission sources such as furnace charging, tapping and leaks, it is presented in this section.

The range of chemical composition of stack emission components in cupola dust has been reported in the literature as shown in Table 2.7-3. Table 2.7-3 indicates that oxides of iron and silicon and combustible materials form a high proportion of cupola dust.

Particle size distribution studies have been performed for stack emissions from cupola furnaces. The data reported in two major studies is shown in Tables 2.7-4 and 2.7-5. There is very little information in the literature on whether or not a relationship exists between particle size distribution and chemical composition of cupola emissions. One source conjectures that a high percentage of less than 5 micron particles is generally observed with substantial percentages of metallic oxides. On the other hand, a high percentage of greater than 4.4 micron particles corresponds to significant amounts of silicon oxides from foundry returns, dirty scrap and combustible materials.[27]

TABLE 2.7-2. PARTICULATE EMISSION CHARACTERISTICS FOR VARIOUS FOUNDRY OPERATIONS[22]

FOUNDRY OPERATION	TYPE	PARTICLE SIZE (μm)
Raw material storage and charge makeup:		
Store metal scrap, coke, limestone, dolomite, fluorspar, silica sand	Coke dust Limestone and sand dust	Fine to coarse 30 to 1,000
Centrifuge or heat metal borings and turnings to remove cutting oil	Oil vapors Smoke Unburned hydrocarbons	.03 to 1 .01 to .4
Weigh charge materials	Coke dust Limestone dust	Fine to coarse 30 to 1,000
Melting:		
Cupola furnace	Fly ash Coke breeze Smoke Metallic oxides Oil Vapors	8 to 20 Fine to coarse .01 to .4 Up to .7 .03 to 1
Electric arc melting	Smoke Metallic oxides Oil vapors	.01 to .4 Up to .7 .03 to 1
Induction furnace	Oil vapors	
Reverberatory (air) furnace	Smoke Oil vapors Metallic oxides Fly ash	.01 to .4 .03 to 1 Up to .7 8 to 20
Furnace charge preheating or drying	Smoke Oil vapors Metallic oxides Metallic oxides	.01 to .4 .03 to 1 75% - 5 to 60 (bottom fired) 0 to 20 (top fired)
Holding furnaces	Iron oxide Oil vapor	Fine to medium .03 to 1
Duplexing furnaces	Oil vapor Metallic oxides	.03 to 1 Up to .7
Inoculation	Metal oxides	Up to .7
Molding, pouring and shakeout:		
Molding	Sand Dust	Coarse

TABLE 2.7-2. CONTINUED

FOUNDRY OPERATION	TYPE	PARTICLE SIZE (um)
Pouring:		
Gray and ductile iron Malleable	Core gases Facing fumes Metallic oxides Fluoride fumes Magnesium oxide fumes Synthetic binder smoke and fumes	 Fine to medium 0.1 to .4
Shakeout	Sand fines Smoke Dust	50% - 2 to 15 .01 to .4 50% - 2 to 15
Cleaning and finishing:		
Abrasive cleaning	Dust	50% - 2 to 15
Grinding	Metal dust Sand fines Abrasives Wheel bond material Vitrified resins	Above 7 Fine to medium 50% - 2 to 7 Fine 50% - 2 to 15
Annealing and heat treating	Oil vapors	.03 to 1
Sand conditioning:		
New sand storage Sand handling system Screening	Fines Fines Fines	50% - 2 to 15 50% - 2 to 15 50% - 2 to 15
Mixing	Fines Flour Bentonites Sea coal Cellulose	50% - 2 to 15 Fine to medium Fine to medium Fine to medium Fine to medium
Drying and reclamation	Dust Oil vapors	50% - 7 to 15 .03 to 1
Sand storage	Sand fines Flour Binders	Fine 50% - 7 to 15
Core making	Sand fines Dust	Fine to medium Fine to medium
Baking	Vapors Smoke	

TABLE 2.7-3. CHEMICAL COMPOSITION OF CUPOLA DUST[23]

Component	% by Weight	
	Mean Range	Scatter Values
SiO_2	20-40	10-45
CaO^2	3-6	2-18
Al_2O_3	2-4	0.5-25
MgO	1-3	0.5-5
FeO (Fe_2O_3, FE)	12-16	5-26
MnO	1-2	0.5-9
Ignition Loss (C,S,CO_2)	20-50	10-64

TABLE 2.7-4. PARTICLE SIZE DISTRIBUTION OF DUST EMISSIONS FROM BOTH COLD AND HOT BLAST CUPOLA FURNACE STACKS[24]

Particle Size (μm)	Cumulative Percent by Weight for Indicated Particle Diameter	
	Cold Blast	Hot Blast (acid)[a]
< 1000	90-100	95-100
< 500	80-90	90-100
< 200	60-80	65-95
< 100	40-65	40-80
< 50	20-50	30-60
< 20	10-30	20-40
< 10	5-25	15-35
< 5	2-20	10-30
< 2	up to 15	5-20

[a] Cupola supplied with a preheated air blast and where slag is formed due to acid constituents originating from the furnace lining.

TABLE 2.7-5. SIZE DISTRIBUTION FOR PARTICULATE EMISSIONS FROM EIGHTEEN CUPOLA FURNACE INSTALLATIONS[25]

Particle Size (μm)	Cumulative Percent by Weight for Indicated Particle Diameter
< 2	14
< 5	24
< 10	34
< 20	44
< 50	61
< 100	78
< 200	93

Chemical composition or particulate emissions from electric arc furnaces at three iron foundries has been reported in one literature source and is shown in Table 2.7-6. The main components in these emissions were iron oxide and silicon dioxide, while substantial amounts of oxides of manganese, aluminum and magnesium were found. The emissions consist almost entirely of the oxides of various metals charged, with lesser amounts of furnace refractories and fluxing materials which were used.[28]

TABLE 2.7-6. CHEMICAL ANALYSIS OF PARTICULATE EMISSIONS FROM AN ELECTRIC ARC FURNACE[26]

Constituent	Proportion of Total Particulate, Weight Percent		
	Foundry A	Foundry B	Foundry C
Iron oxide	75-85	75-85	75-85
Silicon dioxide	10	10	10
Magnesium oxide	2	0.8	1
Manganese oxide	2	2	2
Lead oxide	1	2	0.5
Alumina	0.5	1	0.5
Calcium oxide	0.3	0.2	0.8
Zinc oxide	0.2	2	0.3
Copper oxide	0.04	0.03	0.01
Lithium oxide	0.03	0.03	0.03
Tin oxide	0.03	0.3	0.02
Nickel oxide	0.02	0.03	0.01
Chromium oxide	0.02	0.07	0.01
Barium oxide	0.02	0.07	0.01

Particle size distributions of particulate emissions have also been determined for electric arc furnaces at three foundries. These distributions are shown in Table 2.7-7. It is reported that particulate emissions from electric arc furnace melting and refining are quite small in diameter. Table 2.7-7, which indicates that 80 percent of the emissions have a particle diameter smaller than 5 microns, confirms this conclusion. A second literature reference indicates that 90 to 95 percent of the fumes from electric arc furnaces are below 0.5 microns in size.[29] Another literature source reports that 75 percent of the particulates are less than 5 microns in diameter with a mass median diameter between 2.27 and 2.33 μm.[30]

TABLE 2.7-7. PARTICLE-SIZE DISTRIBUTION FOR PARTICULATE EMISSIONS FROM THREE ELECTRIC-ARC-FURNACE INSTALLATIONS[31]

Particle Size (μm)	Cumulative Percent by Weight for Indicated Particle Diameter		
	Foundry A	Foundry B	Foundry C
< 1	5	8	18
< 2	15	54	61
< 5	28	80	84
< 10	41	89	91
< 15	55	93	94
< 20	68	96	96
< 50	98	99	99

The chemical composition and particle size distributions of particulate emissions from both cupolas and electric arc furnaces are highly variable and are dependent on a number of factors. One literature source concludes that the type of cupola emissions are more affected by the quantity and quality of charge materials, and that the nature and cleanliness of the charged materials are the most important factors in determining the type of emission from electric arc furnaces.[32]

2.7.4 Control Methods

Raw material handling, storage and transfer operations as such are not addressed here but are discussed in Section 2.2 for coke and limestone. These operations for the iron and steel scrap are assumed to be low emission sources, and no control is recommended.

Reduction of emissions from melting operations is enhanced when clean scrap is used in the raw charge. Clean materials that are essentially devoid of dirt, oil or grease carry no extraneous burden into and through the furnace. Use of clean scrap, or the pre-cleaning of dirty scrap before use, are useful and appropriate measures worthy of consideration and adjunctive to and supportive of other control measures. However, it has been reported that the pre-cleaning of dirty scrap is not economically feasible.[33]

Charging and tapping emissions from the cupola may be controlled by hooding the charging and tapping areas and venting the system to fabric filters or scrubbers. Another system that may be used is building evacuation and venting to a fabric filter. Proper sizing of the primary control system to maintain continuous draft through the charging door will help alleviate fugitive emissions.[13] Cupolas with above or below charge takeoffs can maintain a strong in-draft through the charge door and eliminate the escape of fugitive emissions.

Typical control devices used for electric arc or electric induction furnaces include a localized, fixed capture hood and a fabric filter or wet scrubber. The design air volume required to ventilate an electric arc furnace with an integral hood is approximately 2,500 cfm per ton of charge.[7,34] This level of ventilation should provide effective capture of charging and tapping emissions.

Newer furnaces can utilize the above system, canopy hoods (roof mounted hoods) or direct shell evacuation.[30] The latter two control measures may not be feasible on older furnaces due to space and design constraints.

Generally, control measures for charging, melting and tapping emissions from reverberatory furnaces have not been required because of their relatively low emission rates.[35] However, collection of charging and tapping emissions, as well as furnace emissions (if no stack discharge) is technically feasible thru the use of localized hooding or building evacuation with exhaust to a fabric filter or electrostatic precipitator. Such control measures may have to be implemented especially for reverberatory furnaces that are or will be using pulverized coal.

Technically feasible methods for capturing fugitive dusts from all furnace operations include building evacuation or local exhaust systems. (See Figures 2.7-10 and 2.7-11 for examples.) Building evacuation to a collection device can control emissions from all sources in a foundry such as casting shakeout, cooling, cleaning and finishing. (One source reports that the use of building evacuation or general dilution ventilation systems without separate primary emission capture is unlikely to provide a sufficient degree of control for airborne contaminants in most foundries to meet OSHA's permissible exposure limits for such contaminants.[33]) On the other hand, local exhaust control systems generally serve specific sources. Because of the large exhaust volumes and attendant high operating and capital costs for total building evacuation systems, the local exhaust methods are usually favored.

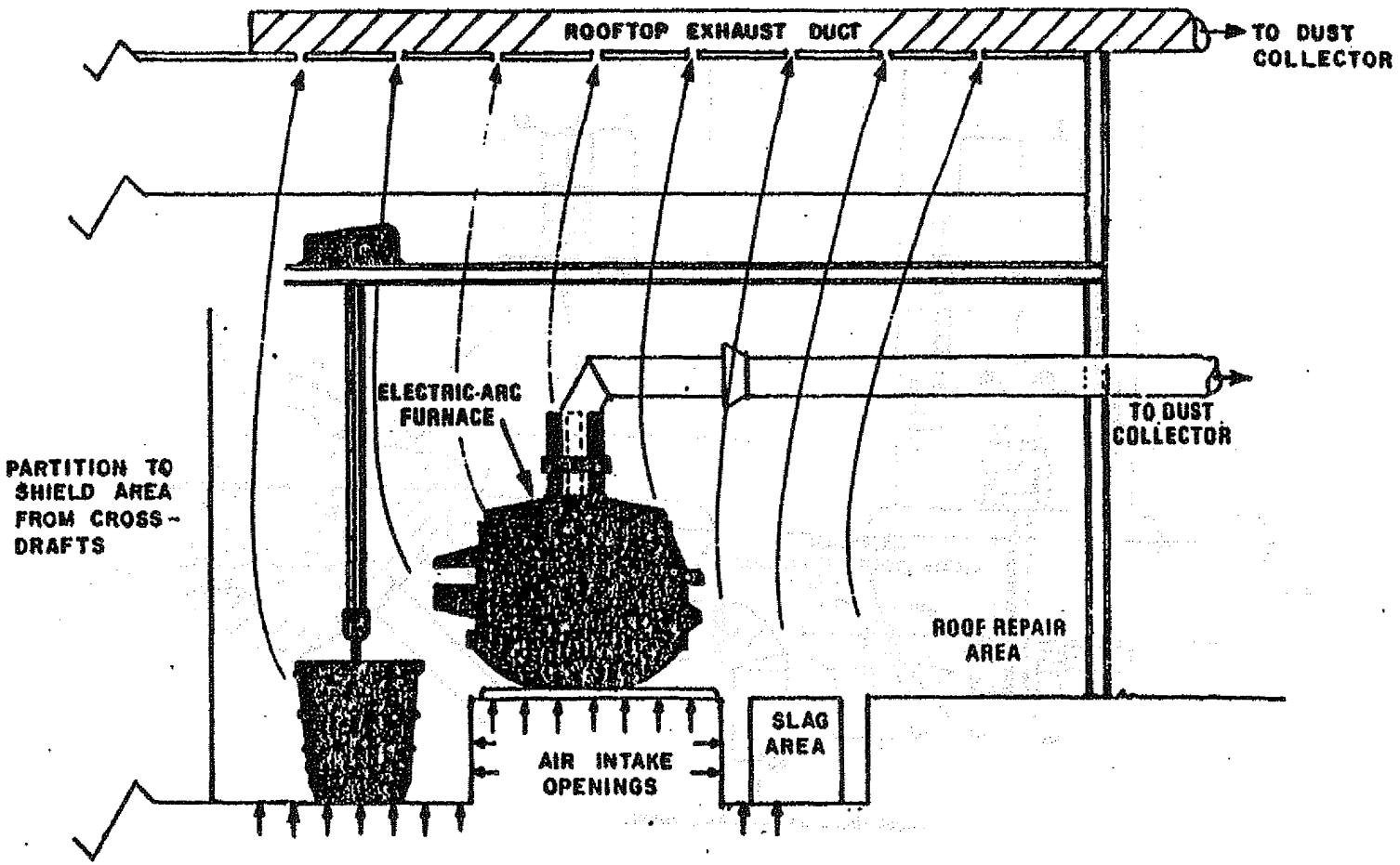

Figure 2.7-10. Building evacuation system.[36]

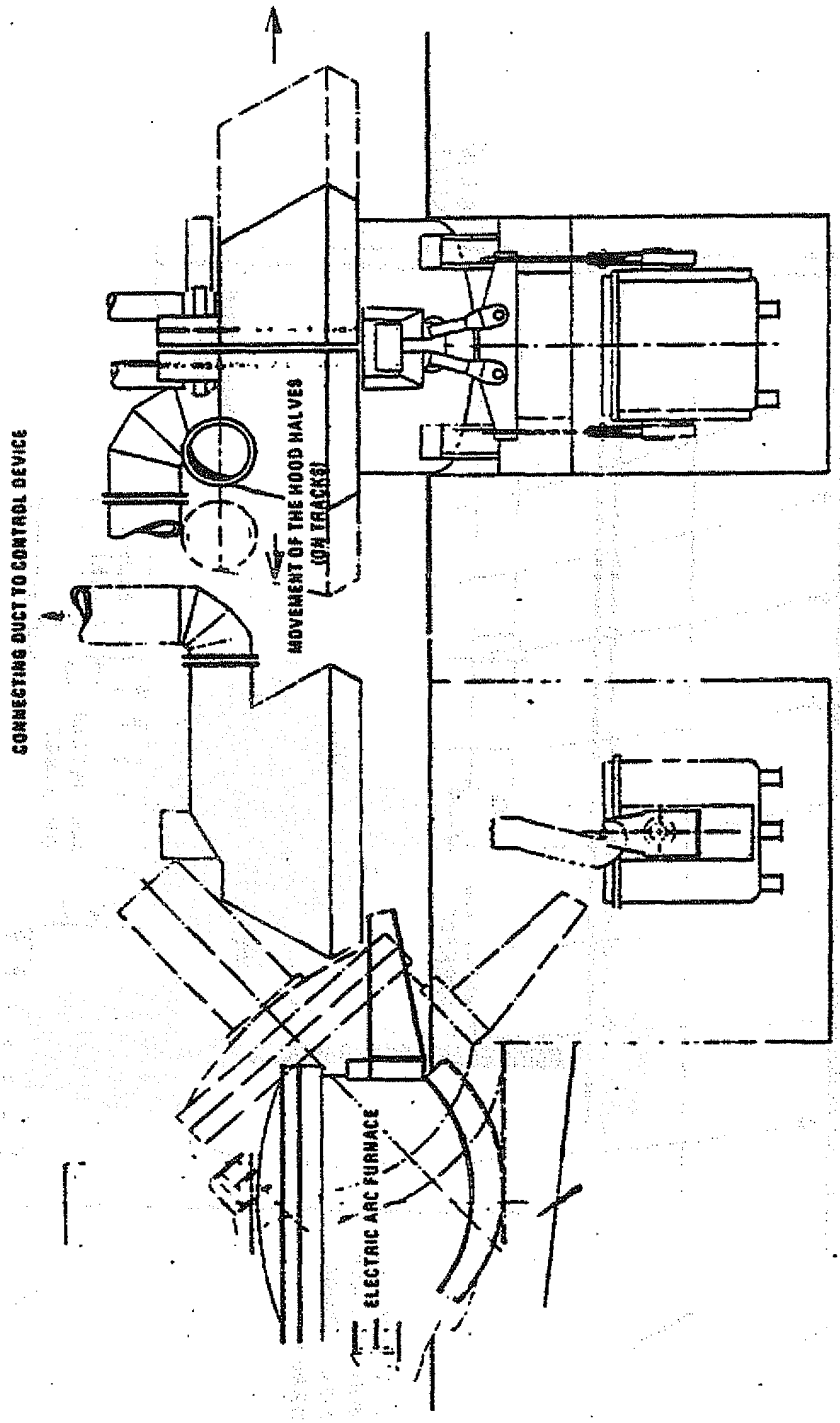

Figure 2.7-11. Mobile tapping hoods.[37]

In recent years, ductile iron inoculation stations have been equipped with collecting hoods or have been installed in enclosed rooms. The evolved gases are exhausted to a dust collection unit. Medium energy wet scrubbers and fabric filters have been used for dust collection.[38]

A side draft hood is often provided for the pouring area, and the mold cooling conveyor between the pouring and shakeout areas is often fully hooded with sheet metal. Also, the use of hooding as illustrated in Figure 2.7-12 is another successful system for capturing emissions from pouring and mold cooling. In this system, air is blown downward from the upper edge of the hood along with the pouring and mold cooling emissions. A variation of this system consists of utilizing an incoming draft from a floor grating rather than from the front edge of the hood. For smaller foundries, a movable pouring hood as shown in Figure 2.7-13 may be effective.[40] In practice, pouring and mold cooling emissions, especially for smaller production and jobbing foundries with non-fixed pouring and cooling locations, are usually exhausted directly to the atmosphere without control.[41] If control measures are deemed necessary, the hoods may be vented to wet scrubbers.

Fugitive dust emissions from the shakeout area are usually collected via a side or bottom draft hood or a partial enclosure. Duct systems from the shakeout usually lead to a single control device, frequently a wet scrubber or fabric filter. Figure 2.7-14 illustrates a shakeout with an enclosure vented to a wet scrubber.

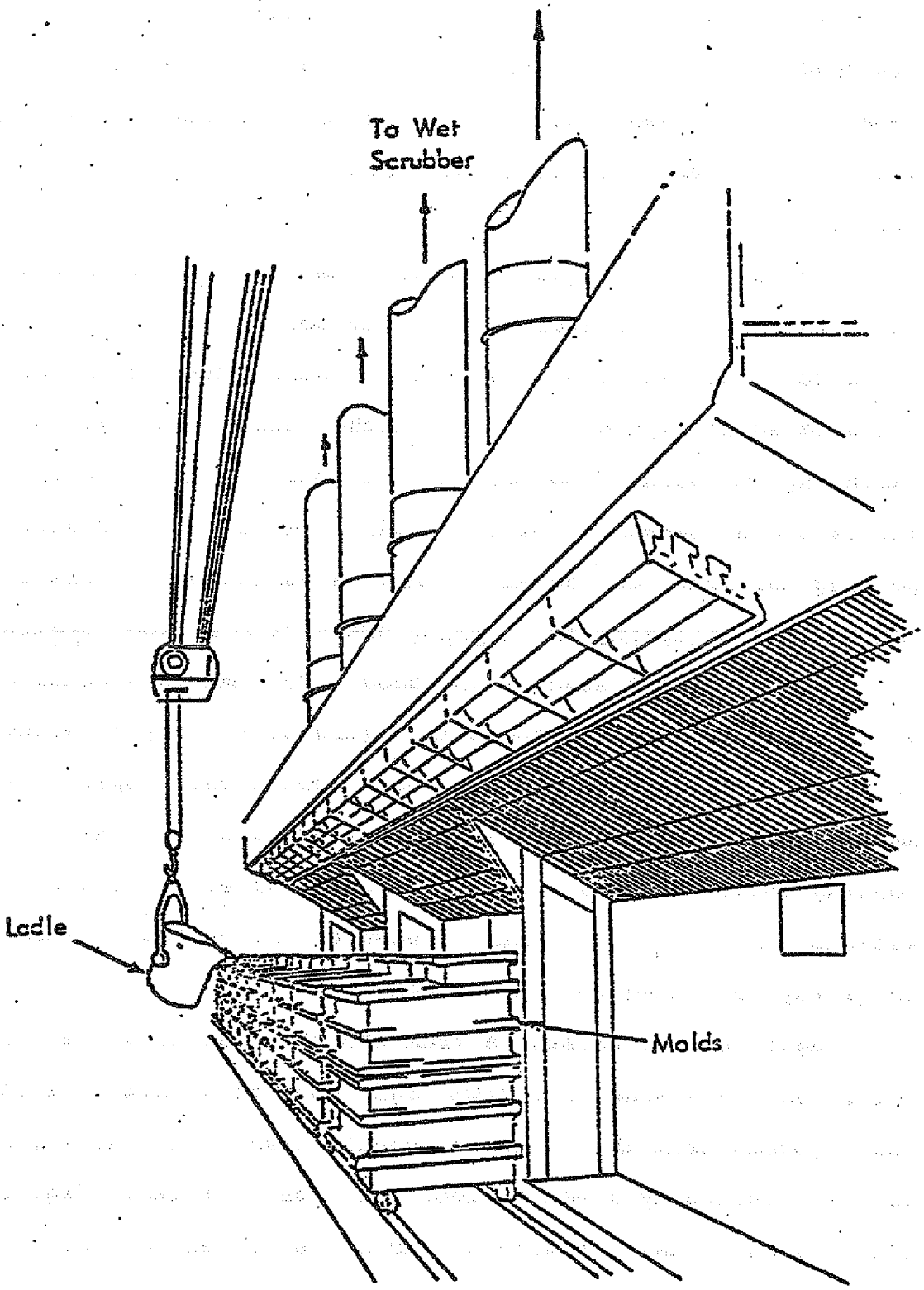

Figure 2.7-12. Hooded pouring station.[39]

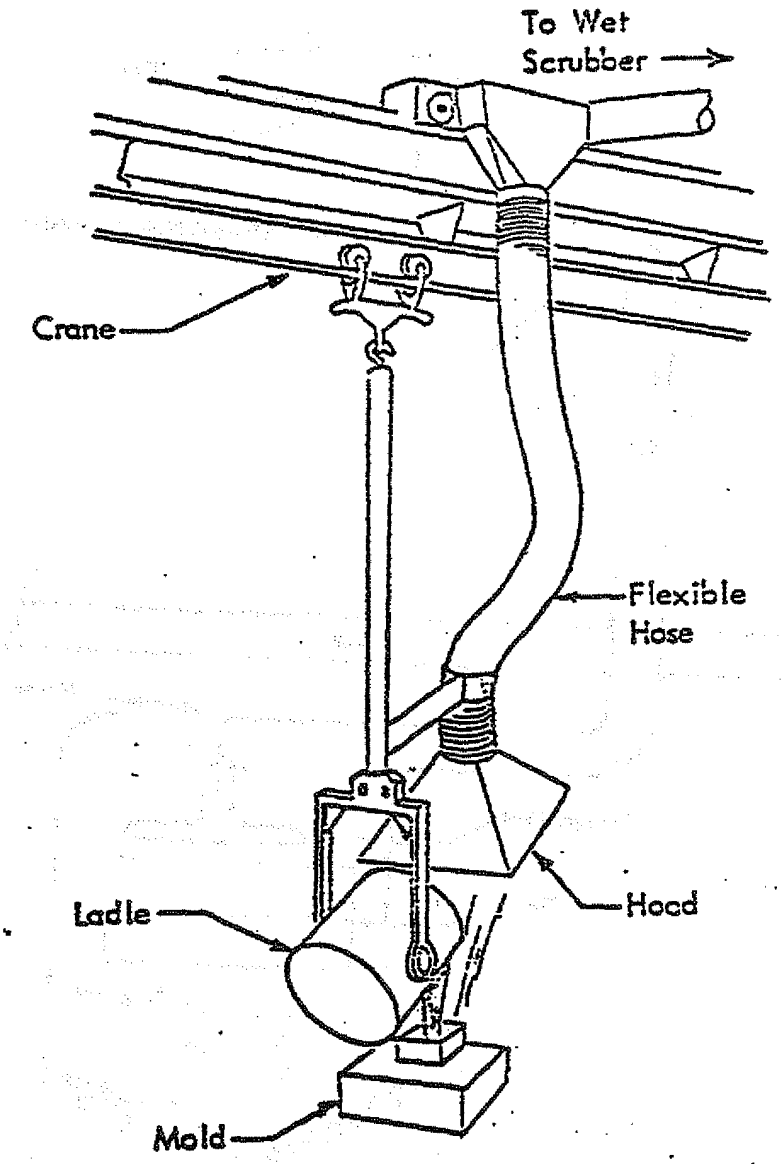

Figure 2.7-13. Movable pouring hood.[42]

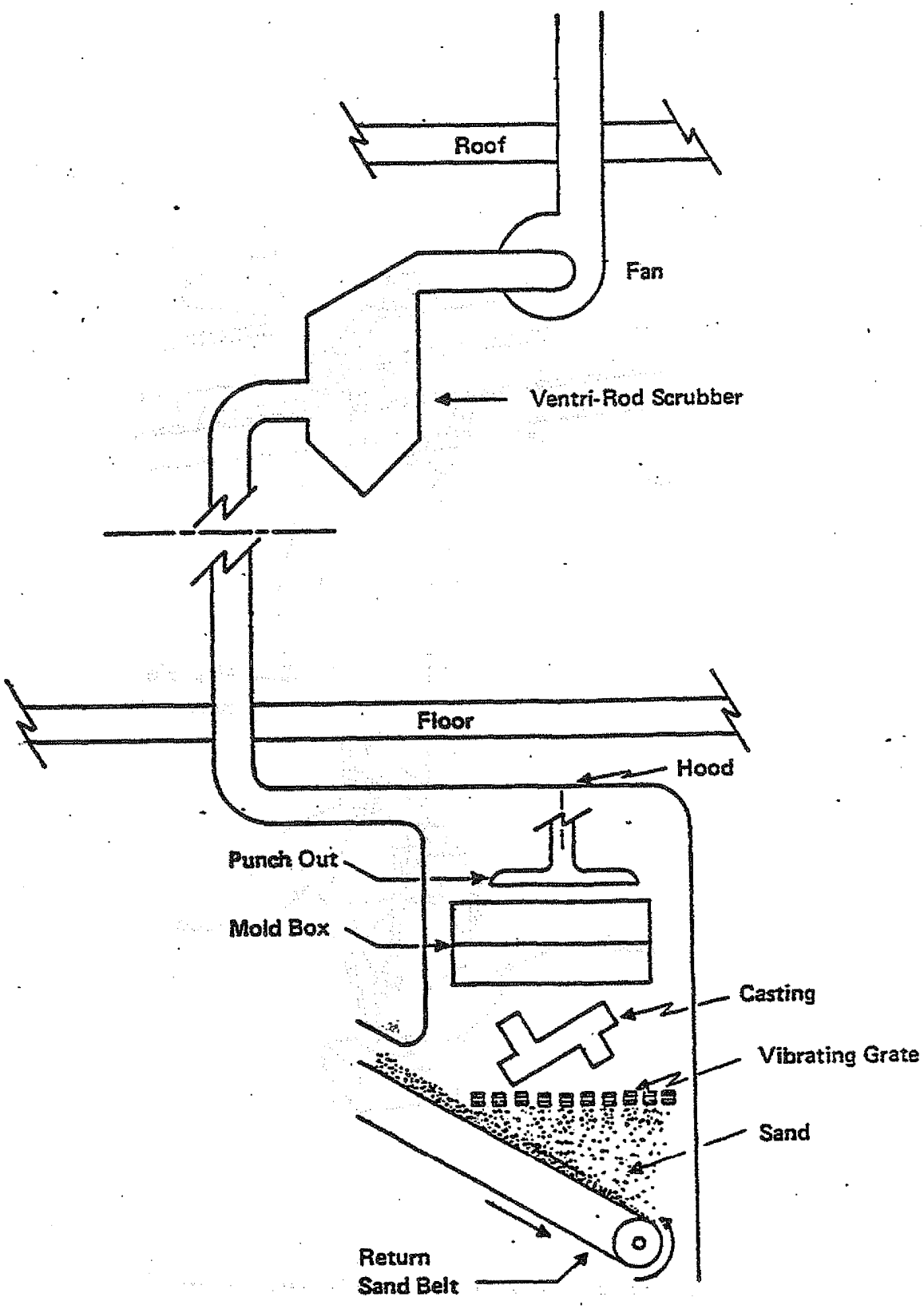

Figure 2.7-14. A casting shakeout control system.[43]

Particulate emissions from cleaning and finishing operations may be captured by local exhaust systems connected to either dry mechanical collectors (i.e., cyclones), fabric filters or wet collectors. Particulate emissions from abrasive shot blasting and tumble cleaners is commonly controlled by fabric filters or medium energy wet collectors. Dry mechanical collectors are also used at abrasive cleaning processes. Grinding operations are normally provided with local exhaust hoods connected to either high efficiency centrifugal collectors (multiple cyclones) or fabric filters.[44]

Coremaking effluents consist primarily of the gases emitted from the cold box, hot box, bake ovens and shell core machines and are usually exhausted to the atmosphere through a ventilation system or are passed through an odor scrubber before venting to the atmosphere.[44] Core ovens, when operated below 400°F and fired with natural gas, do not generally require air pollution control equipment and may be vented directly to the atmosphere. Emissions can be reduced by modifying the composition of the core binders and lowering the baking temperature.[45]

Medium energy wet collectors are best suited for moist sand preparation and handling. When dry sand conditions exist, fabric filters are occasionally used. Often some type of hood is used to capture emissions in sand conveyor systems especially at transfer points. As with many other processes, ductwork and exhaust fans are required in a complete collection system.[44] (Figure 2.7-15 illustrates the capture design on a typical sand-handling system.)

Table 2.7-8 summarizes the available control techniques, their effectiveness, estimated costs and RACM selections.

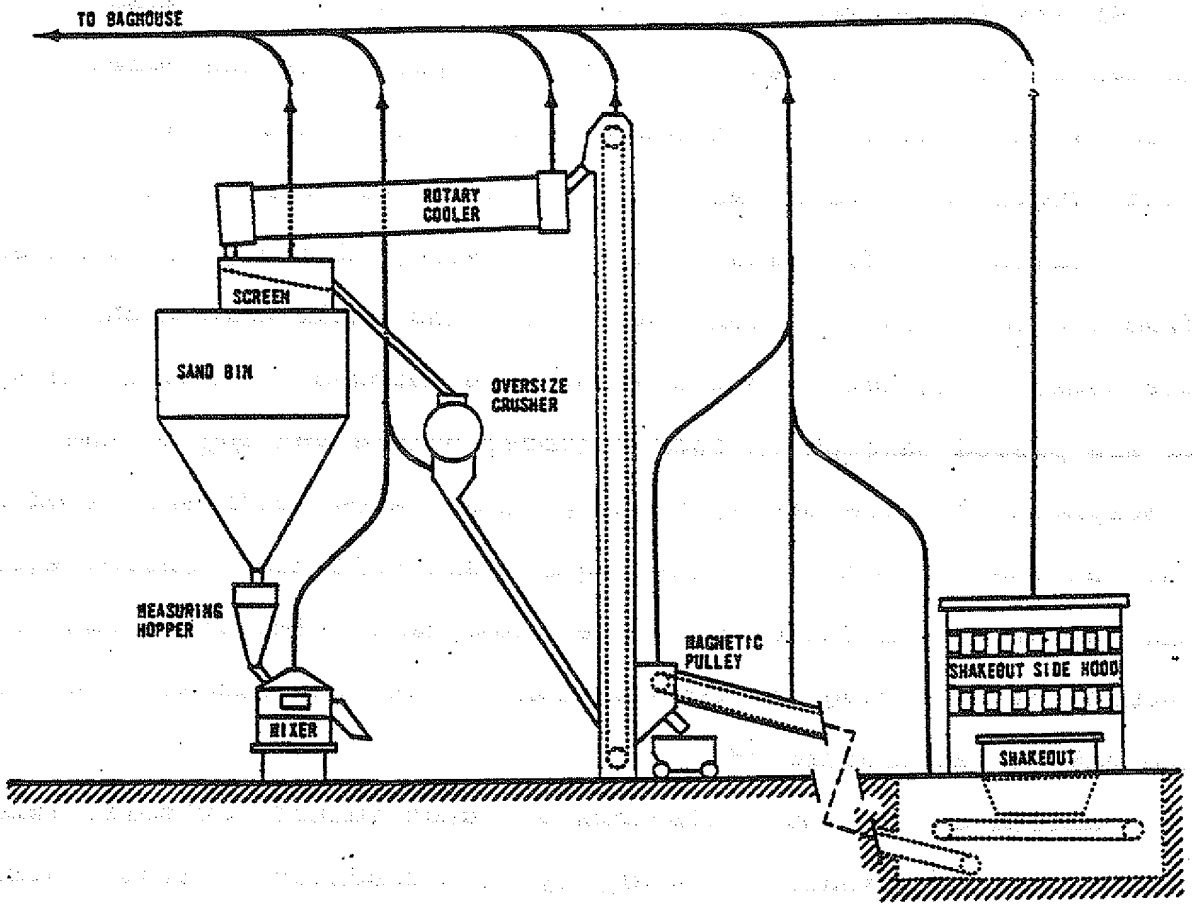

Figure 2.7-15. Capture design for a typical sand-handling system.[46]

2.7.2 Recommended Reasonably Available Control Measures (RACM)

The RACM selections for iron foundry fugitive sources are presented in Table 2.7-3.

The recommended control measure for cupola furnace charging emissions is the maintenance of sufficient draft through the charge door to effectively contain charging emissions and vent them to the existing primary control device. This is the most effective means of control that would not require a large capital outlay for cupolas having above-charge and below-charge take-offs. However, under this control measure, cupola furnace tapping emissions would be uncontrolled.

For control of electric arc and large electric induction furnaces which have primary controls, the selected RACM is maintenance of a continuous draft during the charging and tapping operations through the existing hooding for primary control. This technique could involve some modifications or extensions to the existing hoods to assure good capture. For furnaces which do not have primary controls, RACM consists of localized and canopy hooding which is vented to a fabric filter. For very small electric induction furnaces which have minimal visible emissions, no control is recommended.

No control is recommended for reverberatory furnaces since these are very low emitters of particulate matter and are not usually controlled.

The recommended RACM for ductile iron inoculation is hooding with exhaust to a fabric filter or wet scrubber. This system gives very good control and is commonly applied on existing foundries.

TABLE 2.7-8. A SUMMARY OF THE CONTROL ALTERNATIVES, EFFICIENCIES AND COSTS, AND THE RACM SELECTIONS FOR FUGITIVE DUST EMISSIONS FROM SOURCES AT IRON FOUNDRIES

Fugitive dust sources	Control alternatives	Control efficiency,%	Control costs, Jan. 1980, $		Cost benefit, $/lb	RACM selection
			Capital	Annualized		
(1) Cupola furnace charging and tapping	Hooding, vent to fabric filter	90[a]	336,000[a]	82,000[b]	2.60	Maintenance of continuous draft through charge door (if primary controls present); otherwise hooding, vent to fabric filter
	Building enclosure, evacuation to fabric filter	95[c]	d	d	NA	
	Maintenance of continuous draft through charge door	70[e]	150,000[f]	30,000[g]	1.22	
(2) Electric arc furnace charging and tapping	Hooding, vent to fabric filter	90[a]	336,000[a]	82,000[b]	3.94[r] 1.97[s]	Maintenance of continuous draft during charging and tapping operations (if primary controls present); otherwise hooding, vent to fabric filter
	Building enclosure, evacuation to fabric filter	95[c]	d	d	NA	
	Maintenance of continuous draft during charging and tapping	70[e]	20,000[h]	4,000[g]	0.25[r] 0.12[s]	
(3) Electric induction furnace melting, charging and tapping	Hooding, vent to fabric filter	90[a]	336,000[a]	82,000[b]	1.82	Maintenance of continuous draft during charging and tapping (if primary controls present); otherwise, hooding, vent to fabric filter
	Building enclosure, evacuation to fabric filter	95[c]	d	d	NA	
	Maintenance of continuous draft during charging and tapping	70[e]	20,000[h]	4,000[g]	0.11	
(4) Reverberatory furnace charging and tapping	Hooding, vent to fabric filter or ESP	90[a]	336,000[a]	82,000[b]	27.61	No control
	Building enclosure, evacuation to fabric filter or ESP	95[c]	d	d	NA	
(5) Ductile iron inoculation	Hooding, vent to fabric filter or scrubber	90[a]	153,000[a,i]	33,000[b]	0.28	Hooding, vent to fabric filter or scrubber
	Room enclosure, vent to filter or scrubber	95[c]	d	d	NA	
(6) Pouring molten metal	Hoods, vent to wet scrubber	95[c]	63,000[j]	17,000[b]	0.26	Hoods, vent to scrubber
(7) Casting shakeout	Hoods, vent to wet scrubber or fabric filter	95[c]	234,000[k]	82,000[b]	0.20	Hoods, vent to fabric filter or scrubber

(continued)

TABLE 2.7-8 (continued)

Fugitive dust sources	Control alternatives	Control efficiency, %	Control costs, Jan. 1980, $ Capital	Control costs, Jan. 1980, $ Annualized	Cost benefit, $/lb	RACM selection
(8) Cooling and cleaning castings	Hooding, mechanical collector, fabric filter or scrubber	90[c]	1	1	0.20	m
(9) Finishing castings	Hooding, vent to mechanical collector, fabric filter or scrubber	90-99[a]	1	1	0.20	m
(10) Core and molding sand unloading and storage: mechanical handling	Hooding, vent to mechanical collector	80[c]	33,600[c]	12,000[c]	2.14	Wet suppression (chemical)
	Wet suppression (chemical)	85[c]	26,000[h]	7,000[o]	1.18	
	Enclosure	50[c]	15,000[p]	3,000[g]	0.85	
pneumatic handling	Vent storage hopper to fabric filter	99[c]	NA	NA	NA	Vent storage hopper to fabric filter
(11) Core sand and binder mixing	Hooding, vent to mechanical collector or fabric filter	90[c]	1	1	0.20	m
(12) Core making	Hooding, vent to fabric filter	90[c]	1	1	0.20	m
(13) Core baking	Afterburners	90[c]	35,000[q]	21,000[q]	2.59	No control
(14) Mold sand preparation	Hooding, vent to fabric filter or scrubber	90[c]	1	1	0.20	m
(15) Mold makeup	Hooding, vent to fabric filter or scrubber	90[c]	1	1	0.20	m

NA = Not available.

TABLE 2.7-8 (continued)

[a] Reference 47.
[b] Reference 48.
[c] Estimated.
[d] No cost data available.
[e] Based on control of 95% of charging emissions only. Reference 49.
[f] Reference 49.
[g] Includes only capital charges and maintenance estimated at 20% of capital investment.
[h] Estimated costs of movable ducting required.
[i] Assumed equivalent to control tapping emissions.
[j] Reference 50.
[k] Reference 50. Based on 50,000 acfm and control of sand handling, cooling, cleaning, mixing, core and mold mixing operations.
[l] Control costs included under the casting shakeout system.
[m] RACM is an integrated system ducting the casting shakeout, sand handling, cooling, cleaning, mixing, core and mold making operations to a single fabric filter or wet scrubber.
[n] Reference 51.
[o] Reference 52.
[p] Reference 53. Based on 20' x 20' x 30' enclosure.
[q] Reference 54.
[r] With no alloying in the ladle.
[s] With alloying in the ladle.

The RACM selected for hot metal pouring operations is hooding and local exhaust to a wet scrubber. This type of system provides very good control (95%).

The selected RACM for control of the casting shakeout fugitive emissions is a system of hoods ducted to a common fabric filter or wet scrubber. This system would be designed to handle exhaust gases from the cleaning and cooling of castings, finishing operations, sand and binder mixing, core and mold makeup, and sand preparation and handling operations. This system is very effective and is used in existing foundries.

The sand unloading operations (truck or railcar dumping into receiving hopper) can be effectively controlled by use of wet suppression. Other options offer inferior control at costs on the same order of magnitude. For the pneumatic unloading and storage of sand, the general industry practice is the use of a fabric filter to control emissions from the storage hopper vent.

No control was selected for the core baking operation since with proper operation this is a relatively minor source of particulate emissions.

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Assume furnace capacity = 11 tph or 33,000 tpy

(1) Cupola furnace charging and tapping
Emissions = (1.05 lb/ton)(33,000 tpy) = 35,000 lbs/yr

Hooding, vent to fabric filter

Capital cost = $336,000
Annual cost = 82,000

$$C/B = \frac{\$82,000/yr}{.9\ (35,000)} = \$2.60/lb$$

Building enclosure evacuation to fabric filter
No data

Maintenance of continuous draft through charge door

Capital cost = $150,000
Annual cost = 30,000

$$C/B = \frac{\$30,000/yr}{.70\ (35,000)} = \$1.22/lb$$

(2) Electric arc furnace charging and tapping
Emissions = (0.7 lb/ton)(33,000 tpy) = 23,100 lbs/yr (no alloying in ladle); (1.4 lbs/ton)(33,000 tpy) = 46,200 lbs/yr (with alloying in ladle)

Hooding, vent to fabric filter

Capital cost = $336,000
Annual cost = 82,000

$$C/B = \frac{\$82,000/yr}{.9\ (23,100)} = \$3.94/lb$$

$$C/B = \frac{\$82,000/yr}{.9\ (46,200)} = \$1.97/lb$$

Building enclosure, evacuation to fabric filter
No data

Maintenance of continuous draft during charging and tapping

Capital cost = $20,000
Annual cost = 4,000

$$C/B = \frac{\$4,000/yr}{.7\ (23,100)} = \$0.25/lb$$

$$C/B = \frac{\$4,000/yr}{.7\ (46,200)} = \$0.12/lb$$

(3) Electric induction furnace melting, charging and tapping
Emissions = (1.5 lb/ton)(33,000 tpy) = 50,000 lbs/yr

Hooding, vent to fabric filter

Capital cost = $336,000
Annual cost = 82,000

$$C/B = \frac{\$82,000/yr}{.9\ (50,000)} = \$1.82/lb$$

Building enclosure, evacuation to fabric filter
No data

Maintenance of continuous draft during charging and tapping

Capital cost = $20,000
Annual cost = 4,000

$$C/B = \frac{\$4,000/yr}{.7\ (50,000)} = \$0.11/lb$$

(4) Reverberatory furnace charging and tapping
Emissions = (0.1 lb/ton)(33,000 tpy) = 3,300 lbs/yr

Hooding, vent to fabric filter or ESP

Capital cost = $336,00
Annual cost = 82,000

$$C/B = \frac{\$82,000/yr}{.9\ (3,000)} = \$27.61$$

Building enclosure, evacuation to fabric or ESP
No data

(5) Ductile iron inoculation
Emissions = (3.9 lbs/ton)(33,000 tpy) = 129,000 lbs/yr

Hooding, vent to fabric filter or scrubber

Capital cost = $153,000
Annual cost = 33,000

$$C/B = \frac{\$33,000/yr}{0.9\ (129,000)} = \$0.28/lb$$

Room enclosure, vent to filter or scrubber
No data

(6) Pouring molten metal
Emissions = (2.115 lb/ton)(33,000 tpy) = 70,000 lbs/yr

Hoods, vent to wet scrubber

Capital cost = $63,000
Annual cost = 17,000

$$C/B = \frac{\$17,000/yr}{.95\ (70,000)} = \$0.26/lb$$

(7) Casting shakeout
Emissions = (7.0 lb/ton)(33,000) = 231,000 lbs/yr

Hoods, vent to wet scrubber or fabric filter

Capital cost = $234,000
Annual cost = 82,000

$$C/B = \frac{\$82,000/yr}{.95\ (231,000) + .9\ (16,000) + .95\ (330) + .9\ (148,500) + .9\ (1,000) + .9\ (43,000) + .9\ (1,300)}$$

$$= \$\ 0.20/lb$$

(8) Cooling and cleaning castings
Emissions = (0.48 lb/ton)(33,000 tpy) = 16,000 lbs/yr

Hooding, mechanical collector, fabric filter or scrubber

See (7)
C/B = $0.20/lb

(9) Finishing casting
Emissions = (0.01 lb/ton)(33,000 tpy) = 330 lbs/yr

Hooding, vent to mechanical collector, fabric filter or scrubber

See (7)
C/B = $0.20/lb

(10) Core and molding sand unloading and storage

Mechanical handling

Emissions = (.03 lb/ton)(33,000 tpy)(15)(.5) = 7,000 lbs/yr

Hooding, vent to mechanical collector

Capital cost = $33,600
Annual cost = 12,000

$$C/B = \frac{\$12,000/yr}{.8\ (7,000)} = \$2.14/lb$$

Wet suppression (chemical)

Capital cost = $26,000
Annual cost = 7,000

$$C/B = \frac{\$7,000/yr}{.85\ (7,000)} = \$1.18/lb$$

Enclosure

Capital cost = $15,000
Annual cost = 3,000

$$C/B = \frac{\$3,000/yr}{.5\ (7,000)} = \$0.85/lb$$

Pneumatic handling

Emissions = NA

Vent Storage hopper to fabric filter

No data

(11) Core sand and binder mixing

Emissions = (4.5 lb/ton)(33,000 tpy) = 148,500 lbs/yr

Hooding, vent to mechanical collector or fabric filter

See (7)

C/B = $0.20/lb

(12) Core making

Emissions = (0.35 lb/ton cores)(3,300 tpy) = ∿1,000 lbs/yr

Hooding, vent to fabric filter

See (7)

C/B = $0.20/lb

(13) Core baking
Emissions = (2.7 lb/ton core)(3,300 tpy) = 9,000 lbs/yr

Afterburners

Capital cost = $35,000
Annual cost = 21,000

$$C/B = \frac{\$21,000/yr}{.9\ (9,000)} = \$2.59/lb$$

(14) Mold sand preparation
Emissions = (1.3 lb/ton)(33,000 tpy) = 43,000 lbs/yr

Hooding, vent to fabric filter or scrubber

See (7)
C/B = $0.20/lb

(15) Mold makeup
Emissions = (0.04 lb/ton)(33,000 tpy) = 1,300 lbs/yr

Hooding, vent to fabric filter or scrubber

See (7)
C/B = $0.20/lb

Attachment #5
HAP Justification

Source Inventory, Requested Emission Unit Changes and Installation Status
Fritz Winter North America LP
Franklin, KY

		Inorganic HAP emissions		Organic HAP emissions	
Emission Unit	**Description**	**Inorganic HAP Emissions Present (Y/N)?**	**Remarks Regarding inorganic HAP emissions**	**Organic HAP Emissions Present (Y/N)?**	**Remarks Regarding organic HAP emissions**
EU01	Charge Handling	N	No inorganic HAP emissions expected due to the physical (solid) composition of the materials.	N	No organic HAP emissions identified in the chemical composition of the charge materials and no heat is applied at operation.
EU05	Refractory Burner #1	Y	Inorganic HAP emissions based on combustion of natural gas. See emission unit calculation sheet for quantification.	Y	Organic HAP emissions emitted based on combustion of natural gas. See emission unit calculation sheet for quantification.
EU06	Refractory Burner #2	Y	Inorganic HAP emissions based on combustion of natural gas. See emission unit calculation sheet for quantification.	Y	Organic HAP emissions emitted based on combustion of natural gas. See emission unit calculation sheet for quantification.
EU07	Induction Furnace #1	Y	Inorganic HAP emissions assumed based on metal chemistry, presence of metallic fumes and baghouse dust analytical. See air pollution control device calculations for quantification.	N	No organic HAP content identified in charge materials.
EU08	Induction Furnace #2	Y	Inorganic HAP emissions assumed based on metal chemistry, presence of metallic fumes and baghouse dust analytical. See air pollution control device calculations for quantification.	N	No organic HAP content identified in charge materials.
EU09	Induction Furnace #3	Y	Inorganic HAP emissions assumed based on metal chemistry, presence of metallic fumes and baghouse dust analytical. See air pollution control device calculations for quantification.	N	No organic HAP content identified in charge materials.
EU10	Induction Furnace #4	Y	Inorganic HAP emissions assumed based on metal chemistry, presence of metallic fumes and baghouse dust analytical. See air pollution control device calculations for quantification.	N	No organic HAP content identified in charge materials.
EU13	Hot Metal Transfer	Y	Inorganic HAP emissions assumed based on metal chemistry, presence of metallic fumes and baghouse dust analytical. See air pollution control device calculations for quantification.	N	No organic HAP content identified in charge materials.
EU15	Pouring Furnace #1	Y	Inorganic HAP emissions based on combustion of natural gas. See emission unit calculation sheet for quantification.	Y	Organic HAP emissions emitted based on combustion of natural gas. See emission unit calculation sheet for quantification.
EU16	Pouring Furnace #2	Y	Inorganic HAP emissions based on combustion of natural gas. See emission unit calculation sheet for quantification.	Y	Organic HAP emissions emitted based on combustion of natural gas. See emission unit calculation sheet for quantification.
EU17	Melt and Core/Mold Baghouse Waste Dust Silo	Y	Inorganic HAP emissions identified based on higher of CU01 and CU08 baghouse dust analyticals and presence of particulate emissions from several inorganic HAP emitting processes. See air pollution control device calculations for quantification.	N	No organic HAP emissions identified in the chemical composition of the charge materials and no heat is applied at operation.
EU18	Refractory Curing Mobile Burner	Y	Inorganic HAP emissions based on combustion of natural gas. See emission unit calculation sheet for quantification.	Y	Organic HAP emissions emitted based on combustion of natural gas. See emission unit calculation sheet for quantification.
EU19	Mold Silica Sand Silo	N	No inorganic HAP emissions expected due to the chemical composition of the incoming material (silica sand)	N	No organic HAP emissions expected due to the chemical composition of the incoming material (silica sand) and no heat is applied at the operation.
EU20	Blend Silo	N	No inorganic HAP emissions expected due to the chemical composition of the incoming material.	N	No organic HAP emissions expected due to physical composition of the incoming material and no heat is applied at the operation.
EU21	Bentonite Silo	N	No inorganic HAP emissions expected due to the chemical composition of the incoming material.	N	No organic HAP emissions expected due to physical composition of the incoming material and no heat is applied at the operation.
EU22	Mold Sand Handling and Preparation	Y	Limited inorganic HAP emissions emitted due to carryover metallics from pouring, cooling and shakeout prior to magnetic separation. Emissions based on baghouse dust analytical. See air pollution control device calculations for emission rates	N	No organic HAP emissions expected due to physical composition of the incoming material and no heat is applied at the operation.
EU33	Mold Making #1	N	No inorganic HAP emissions expected due to the chemical composition of the incoming material.	N	No organic HAP emissions expected due to physical composition of the incoming material and no heat is applied at the operation.
EU34	Mold Making #2	N	No inorganic HAP emissions expected due to the chemical composition of the incoming material.	N	No organic HAP emissions expected due to physical composition of the incoming material and no heat is applied at the operation.
EU35A	Core Silica Sand Silo A	N	No inorganic HAP emissions expected due to the chemical composition of the incoming material (silica sand)	N	No organic HAP emissions expected due to the chemical composition of the incoming material (silica sand) and no heat is applied at the operation.
EU35B	Core Silica Sand Silo B	N	No inorganic HAP emissions expected due to the chemical composition of the incoming material (silica sand)	N	No organic HAP emissions expected due to the chemical composition of the incoming material (silica sand) and no heat is applied at the operation.
EU36	Core Sand Handling and Preparation	N	No inorganic HAP emissions expected due to the chemical composition of the incoming material (silica sand)	N	No organic HAP emissions expected due to the chemical composition of the incoming material (silica sand) and no heat is applied at the operation.
EU39	PUCB Core Machine #1	N	No inorganic HAP emissions expected due to the chemical composition of the incoming material (silica sand, resin and catalyst)	Y	Organic HAP emissions emitted due to organic resin usage. See emission unit calculation worksheet.
EU40	PUCB Core Machine #2	N	No inorganic HAP emissions expected due to the chemical composition of the incoming material (silica sand, resin and catalyst)	Y	Organic HAP emissions emitted due to organic resin usage. See emission unit calculation worksheet.
EU41	PUCB Core Machine #3	N	No inorganic HAP emissions expected due to the chemical composition of the incoming material (silica sand, resin and catalyst)	Y	Organic HAP emissions emitted due to organic resin usage. See emission unit calculation worksheet.
EU42	PUCB Core Machine #4	N	No inorganic HAP emissions expected due to the chemical composition of the incoming material (silica sand, resin and catalyst)	Y	Organic HAP emissions emitted due to organic resin usage. See emission unit calculation worksheet.
EU43	Core Wash Station #1	N	No inorganic HAPs identified in chemical composition of core wash.	N	No organic HAPs identified in chemical composition of core wash.
EU44	Core Dryer #1	Y	Inorganic HAP emissions based on combustion of natural gas. See emission unit calculation sheet for quantification.	Y	organic HAP emissions emitted based on combustion of natural gas. See emission unit calculation sheet for quantification.
EU45	Core Dryer #2	Y	Inorganic HAP emissions based on combustion of natural gas. See emission unit calculation sheet for quantification.	Y	Organic HAP emissions emitted based on combustion of natural gas. See emission unit calculation sheet for quantification.

Source Inventory, Requested Emission Unit Changes and Installation Status
Fritz Winter North America LP
Franklin, KY

EU46	Core Dryer #3	Y	Inorganic HAP emissions based on combustion of natural gas. See emission unit calculation sheet for quantification.	Y	Organic HAP emissions emitted based on combustion of natural gas. See emission unit calculation sheet for quantification.
EU47	Core Dryer #4	Y	Inorganic HAP emissions based on combustion of natural gas. See emission unit calculation sheet for quantification.	Y	Organic HAP emissions emitted based on combustion of natural gas. See emission unit calculation sheet for quantification.
EU50	Pouring #1	Y	Inorganic HAP emissions assumed based on metal chemistry, presence of metallic fumes and baghouse dust analytical. See air pollution control device calculations for quantification.	Y	Organic HAP emissions based on thermal decomposition of mold and core sand organic material. See emission unit calculation worksheet.
EU51	Pouring #2	Y	Inorganic HAP emissions assumed based on metal chemistry, presence of metallic fumes and baghouse dust analytical. See air pollution control device calculations for quantification.	Y	Organic HAP emissions based on thermal decomposition of mold and core sand organic material. See combined pouring, cooling shakeout emission unit calculation worksheet for both "mold" and "core."
EU52	Mold Cooling	Y	Inorganic HAP emissions assumed based on metal chemistry, presence of metallic fumes and baghouse dust analytical. See air pollution control device calculations for quantification.	Y	Organic HAP emissions based on thermal decomposition of mold and core sand organic material. See combined pouring, cooling shakeout emission unit calculation worksheet for both "mold" and "core."
EU53	Shakeout Conveyor	Y	Inorganic HAP emissions assumed based on metal chemistry and baghouse dust analytical. See air pollution control device calculations for quantification.	Y	Organic HAP emissions based on thermal decomposition of mold and core sand organic material. See combined pouring, cooling shakeout emission unit calculation worksheet for both "mold" and "core."
EU57	Sand Plant Baghouse Waste Dust Silo	Y	inorganic HAP emissions assumed based on control device CU06 baghouse dust analytical and presence of captured particulate emissions from Shakeout Conveyor (EU53). See air pollution control device calculations for emission rates.	N	No organic HAP emissions expected due to physical composition of the incoming material and no heat is applied at the operation.
EU59	Casting Cooling	Y	Limited inorganic HAP emissions emitted due to carryover metal from pouring, cooling and shakeout. Emissions based on baghouse dust analytical. See air pollution control device calculations for emission rates	N	No organic HAP emissions expected due to physical composition of the incoming material and no heat is applied at the operation.
EU60	Sorting Conveyor	N	No inorganic HAP emissions expected given residual sand is the likely particulate.	N	No organic HAP emissions expected due to physical composition of the incoming material and no heat is applied at the operation.
EU61	Steel Shot Blasting #1	Y	Inorganic HAP emissions assumed based on metal chemistry and baghouse dust analytical. See air pollution control device calculations for quantification.	N	No organic HAPs identified in chemical composition of cast iron.
EU62	Steel Shot Blasting #2	Y	Inorganic HAP emissions assumed based on metal chemistry and baghouse dust analytical. See air pollution control device calculations for quantification.	N	No organic HAPs identified in chemical composition of cast iron.
EU63	Fettling Baghouse Waste Dust Silo	Y	inorganic HAP emissions assumed based on control device CU11 baghouse dust analytical and presence of captured particulate emissions from Shot Blasting and Griinding Operations. See air pollution control device calculations for emission rates.	N	No organic HAPs identified in chemical composition of cast iron.
EU64	Auto Grinding #1	Y	Inorganic HAP emissions assumed based on metal chemistry and baghouse dust analytical. See air pollution control device calculations for quantification.	N	No organic HAPs identified in chemical composition of cast iron.
EU65	Auto Grinding #2	Y	Inorganic HAP emissions assumed based on metal chemistry and baghouse dust analytical. See air pollution control device calculations for quantification.	N	No organic HAPs identified in chemical composition of cast iron.
EU66	Machining Lines (9)	Y	Inorganic HAP emissions assumed based on metal chemistry and baghouse dust analytical. See air pollution control device calculations for quantification.	N	No organic HAPs identified in chemical composition of cast iron.
EU67	Perforation Line #2	Y	Inorganic HAP emissions assumed based on metal chemistry and baghouse dust analytical. See air pollution control device calculations for quantification.	N	No organic HAPs identified in chemical composition of cast iron.
EU68	Paint Line #3	N	No inorganic HAP emissions expected due to chemical composition of the coatings.	Y	Organic HAP content based on chemical composition of the coating used. See emission unit calculation worksheet.
EU69	Paint Line #2	N	No inorganic HAP emissions expected due to chemical composition of the coatings.	Y	Organic HAP content based on chemical composition of the coating used. See emission unit calculation worksheet.
EU71	Paint Line #1	N	No inorganic HAP emissions expected due to chemical composition of the coatings.	Y	Organic HAP content based on chemical composition of the coating used. See emission unit calculation worksheet.
EU72	Emergency Generator #1	Y	Inorganic HAP emissions based on combustion of diesel fuel. See emission unit calculation sheet for quantification.	Y	Organic HAP emissions emitted based on combustion of diesel fuel. See emission unit calculation sheet for quantification.
EU73	Emergency Generator #2	Y	Inorganic HAP emissions based on combustion of diesel fuel. See emission unit calculation sheet for quantification.	Y	Organic HAP emissions emitted based on combustion of diesel fuel. See emission unit calculation sheet for quantification.
EU74	Emergency Generator #3	Y	Inorganic HAP emissions based on combustion of diesel fuel. See emission unit calculation sheet for quantification.	Y	Organic HAP emissions emitted based on combustion of diesel fuel. See emission unit calculation sheet for quantification.
EU75	Diesel Storage Tank	N	None quantified	N	None quantified
EU76	Paved Roads	N	No inorganic HAP emissions expected due to the operation	N	No organic HAP emissions expected due to the operation
EU77	Snag Grinder #1	Y	Inorganic HAP emissions assumed based on metal chemistry and baghouse dust analytical. See air pollution control device calculations for quantification.	N	No organic HAPs identified in chemical composition of cast iron.
EU78	Snag Grinder #2	Y	Inorganic HAP emissions assumed based on metal chemistry and baghouse dust analytical. See air pollution control device calculations for quantification.	N	No organic HAPs identified in chemical composition of cast iron.
EU79	Core Wash Station #2	N	No inorganic HAPs identified in chemical composition of core wash.	N	No organic HAPs identified in chemical composition of core wash.
EU80	Core Wash Station #3	N	No inorganic HAPs identified in chemical composition of core wash.	N	No organic HAPs identified in chemical composition of core wash.
EU81	Core Wash Station #4	N	No inorganic HAPs identified in chemical composition of core wash.	N	No organic HAPs identified in chemical composition of core wash.
EU82	Rust Preventative Application	N	No inorganic HAPs identified in chemical composition of core wash.	N	No organic HAPs identified in chemical composition of core wash.

Attachment #6
Permit V-16-022 R1 Markup

Commonwealth of Kentucky
Energy and Environment Cabinet
Department for Environmental Protection
Division for Air Quality
300 Sower Boulevard
Frankfort, Kentucky 40601
(502) 564-3999

Final

AIR QUALITY PERMIT

Issued under 401 KAR 52:020

Permittee Name:	**Fritz Winter North America, LP**
Mailing Address:	**1 Fritz Winter Drive** **Franklin, Kentucky 42134**
Source Name:	**Fritz Winter North America, LP**
Mailing Address:	**1 Fritz Winter Drive** **Franklin, Kentucky 42134**
Source Location:	**Simpson County**
Permit:	**V-16-022 R21**
Agency Interest:	**129745**
Activity:	**~~APE20160004~~**
Review Type:	**Title V / Title I – PSD Construction/Operating**
Source ID:	**21-213-00064**
Regional Office:	**Bowling Green Regional Office** **2642 Russellville Road** **Bowling Green, KY 42101** **(270) 746-7475**
County:	**Simpson**
Application Complete Date:	**July 11, 2016**
Issuance Date:	**October 24, 2016**
Revision Date:	**~~November 25, 2017~~**
Expiration Date:	**~~October 24, 2021~~**

Rick S. Shewekah for

Sean Alteri, Director
Division for Air Quality

Version 10/16/13

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	Permit type	Activity#	Complete Date	Issuance Date	Summary of Action
V-16-022	**Initial**	**APE20160001**	**7/11/2016**	**10/24/2016**	**Initial Construction Permit**
V-16-022 R1	**Significant Revision**	**APE20160004**	**6/6/2017**	**11/25/2017**	**Revision to previously permitted PSD project**

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SECTION A - PERMIT AUTHORIZATION

Pursuant to a duly submitted application the Kentucky Division for Air Quality (Division) hereby authorizes the operation of the equipment described herein in accordance with the terms and conditions of this permit. This permit has been issued under the provisions of Kentucky Revised Statutes (KRS) Chapter 224 and regulations promulgated pursuant thereto.

The permittee shall not construct, reconstruct, or modify any affected facilities without first submitting a complete application and receiving a permit for the planned activity from the permitting authority, except as provided in this permit or in 401 KAR 52:020, Title V Permits.

Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits, licenses, or approvals required by the Kentucky Energy and Environment Cabinet (Cabinet) or any other federal, state, or local agency.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS

Metal Melting Furnaces

Emission Group 01 – Melt Shop

Emission Unit 07 (EU07) **Induction Furnace #1**
Description:
Model: Junker – MFTGe Duomelt
Estimated Start of Construction: March 2017~~August 2016~~
Maximum Throughput: 10 tons gray iron/hr
Controls: Baghouse (CU01)

Emission Unit 08 (EU08) **Induction Furnace #2**
Description:
Model: Junker – MFTGe Duomelt
Estimated Start of Construction: March~~August~~ 2017~~6~~ Maximum Throughput: 10 tons gray iron/hr Controls: Baghouse (CU01)

Emission Unit 09 (EU09) **Induction Furnace #3**
Description:
Model: Junker – MFTGe Duomelt Estimated Start of Construction: July~~March~~ 2019
Maximum Throughput: 10 tons gray iron/hr
Controls: Baghouse (CU01)

Emission Unit 10 (EU10) **Induction Furnace #4**
Description:
Model: Junker – MFTGe Duomelt
Estimated Start of Construction: July~~March~~ 2019
Maximum Throughput: 10 tons gray iron/hr
Controls: Baghouse (CU01)

Description: Four (4) electric induction furnaces that have a maximum short-term capacity of 10 tons gray iron/hr each, or 40 tons/hr combined.

APPLICABLE REGULATIONS:
401 KAR 51:017, Prevention of significant deterioration of air quality.
401 KAR 59:010, New process operations.
401 KAR 63:002, Section 2(4)(bbbbb) implementing **40 CFR 63, Subpart ZZZZZ,** *National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries Area Sources.*

1. **Operating Limitations:**
   a. The permittee shall comply with the pollution prevention management practices in 40 CFR 63.10885, the requirements in 40 CFR 63.10895(b) through (e), and the requirements in 40 CFR 63.10896 through 63.10900. [40 CFR 63.10895(a)]

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Commented [CS4]: Need to integrate any new language of the revised Foundry Area Source Rule (Subpart ZZZZZ) issued post Residual Risk Technology Review (RTR).

As stated below, the preference would be to identify Subpart ZZZZZ at the facility level and let FWNA determine applicable requirements.

Commented [CS5]: The permit would be significant improved if Subpart ZZZZZ was identified as applicable but the specific requirements be left to FWNA to determine. While this is the langauge from Subpart ZZZZZ, 63.10897(a)(2) - (a)(4) is not applicable. Neither is (b)(3). Also 63.10898(a)(1), (a)(2), (a)(3), (a)(4), (a)(5) are not applicable.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

b. The permittee shall operate a capture and collection system for each metal melting furnace. Each capture and collection system shall meet accepted engineering standards, such as those published by the American Conference of Governmental Industrial Hygienists. [40 CFR 63.10895(b)]

c. The permittee shall prepare and operate at all times according to a written operation and maintenance (O&M) plan for each control device for each induction furnace. The permittee shall maintain a copy of the O&M plan at the facility and make it available for review upon request. At a minimum, each plan shall contain the following information: [40 CFR 63.10896(a)]
   i. General facility and contact information; [40 CFR 63.10896(a)(1)]
   ii. Positions responsible for inspecting, maintaining, and repairing emissions control devices which are used to comply with 40 CFR 63, Subpart ZZZZZ; [40 CFR 63.10896(a)(2)]
   iii. Description of items, equipment, and conditions that will be inspected, including an inspection schedule for the items, equipment, and conditions. For baghouses that are equipped with bag leak detection systems, the O&M plan shall include the site- specific monitoring plan required in 40 CFR 63.10897(d)(2). [40 CFR 63.10896(a)(3)]
   iv. Identity and estimated quantity of the replacement parts that will be maintained in inventory; and [40 CFR 63.10896(a)(4)]
   v. Procedures for operating and maintaining a continuous parameter monitoring system (CPMS) in accordance with manufacturer's specifications. [40 CFR 63.10896(a)(5)]

d. The permittee may use any other O&M, preventative maintenance, or similar plan which addresses the requirements in 40 CFR 63.10896(a)(1) through (5) to demonstrate compliance with the requirements for an O&M plan. [40 CFR 63.10896(b)]

e. The permittee shall limit the operation of EU07, EU08, EU09, and EU10 to a combined maximum of 91,586 tons of gray iron processed per year, on a rolling 12-month basis. [401 KAR 51:017]

Compliance Demonstration Method:
Refer to **4. Specific Monitoring Requirements, 5. Specific Recordkeeping Requirements, 6. Specific Reporting Requirements,** and **7. Specific Control Equipment Operating Conditions.**

f. The permittee shall maintain the capture efficiency of each hood and exhaust pickup point serving EU07, EU08, EU09, and EU10 at or above 98% capture efficiency for PM, PM_{10}, and $PM_{2.5}$. [401 KAR 51:017]

~~g. The permittee shall ensure that the building removal efficiency for PM, PM_{10}, and $PM_{2.5}$ in the building that houses EU07, EU08, EU09, and EU10 is at least 90%. [401 KAR 51:017]~~

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Compliance Demonstration Method:
Compliance with **1. Operating Limitations (f)** and **(g)** shall be demonstrated by completing the testing in **3. Testing Requirements (l),** submitting the report required in **6. Specific Reporting Requirements (c),** and monitoring according to **7. Specific Control Requirements (d).**

2. **Emission Limitations:**
   a. The permittee shall not discharge to the atmosphere emissions from any metal melting furnace or group of all metal melting furnaces that exceed 0.1 pounds of PM per ton of metal charged or 0.008 pounds of total metal HAP per ton of metal charged. [40 CFR 63.10895(c)(2)]

   b. The permittee shall not discharge to the atmosphere fugitive emissions from foundry operations that exhibit opacity greater than 20 percent (6-minute average), except for one 6-minute average per hour that does not exceed 30 percent. [40 CFR 63.10895(e); 401 KAR 51:017]
      i. For the purposes of 40 CFR 63, Subpart ZZZZZ and the limit above: *Fugitive emissions* means any pollutant released to the atmosphere that is not discharged through a system of equipment that is specifically designed to capture pollutants at the source, convey them through ductwork, and exhaust them using forced ventilation. *Fugitive emissions* include pollutants released to the atmosphere through windows, doors, vents, or other building openings. *Fugitive emissions* also include pollutants released to the atmosphere through other general building ventilation or exhaust systems not specifically designed to capture pollutants at the source. [40 CFR 63.10906]

Compliance Demonstration Method:
Refer to **3. Testing Requirements, 4. Specific Monitoring Requirements, 5. Specific Recordkeeping Requirements, 6. Specific Reporting Requirements,** and **7. Specific Control Equipment Operating Conditions.**

   c. The permittee shall not cause, suffer, allow, or permit any continuous (persisting more than 3 minutes) emission of particulate matter into the open air from a control device or stack associated with any affected facility which is equal to or greater than twenty (20) percent opacity, as measured by U.S. EPA Reference Method 9. [401 KAR 59:010, Section 3(1)(a); 401 KAR 51:017]

Compliance Demonstration Method:
Refer to **4. Monitoring Requirements(d)** for opacity compliance demonstration.

   d. For emissions from a control device or stack no person shall cause, suffer, allow or permit the emission into the open air of particulate matter from any affected facility which is in excess of the following: [401 KAR 59:010, Section 3(2)]
      i. For process weight rates of 0.50 ton/hr or less: 2.34 lb/hr
      ii. For process weight rates up to 30 tons/hr: $E_{PM_j} = 3.59P_j^{0.62}$

      Where:
      j = Emission Unit;

Commented [CS6]: Missing the alternative standard is another justification for just identifying Subpart ZZZZZ as applicable but not try and identify the specific portions of a rule but identify the rule as a facility-level requirement.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

E'_{PM_j} = The allowable particulate emission rate for unit j in pounds/hour;
P_j = The average process weight rate in tons/hour

Compliance Demonstration Method:
Compliance with the hourly particulate emission limitations in 401 KAR 59:010, Section 3(2) is assumed when compliance with the limitations in **SECTION D(5)** is demonstrated.

e. Refer to **SECTION D** for group PSD limits for PM, PM_{10}, and $PM_{2.5}$, and source-wide HAP emission limitations.

3. **Testing Requirements:**

a. ~~The permittee shall conduct a performance test to demonstrate initial compliance with the applicable emissions limits for each metal melting furnace or group of all metal melting furnaces that is subject to an emissions limit in 40 CFR 63.10895(c) and for each building or structure housing foundry operations that is subject to the opacity limit for fugitive emissions in 40 CFR 63.10895(e). The permittee shall conduct the test within 180 days of startup and report the results in the notification of compliance status. [40 CFR 63.10898(a)~~]

Commented [CS7]: Emission unit has already demonstrated initial compliance with Subpart ZZZZZ

b. The permittee shall conduct subsequent performance tests to demonstrate compliance with all applicable PM or total metal HAP emissions limits in 40 CFR 63.10895(c) for a metal melting furnace or group of all metal melting furnaces no less frequently than every 5 years and each time the permittee elects to change an operating limit or make a process change likely to increase HAP emissions. [40 CFR 63.10898(b)]

c. The permittee shall conduct each performance test according to the requirements in 40 CFR 63.7(e)(1), Table 1 to 40 CFR 63, Subpart ZZZZZ, and 40 CFR 63.10898(d) through (g). [40 CFR 63.10898(c)]

d. To determine compliance with the applicable PM or total metal HAP emissions limit in 40 CFR 63.10895(c) for a metal melting furnace in a lb/ton of metal charged format, compute the process-weighted mass emissions (E_p) for each test run using Equation 1: [40 CFR 63.10898(d)]

$$E_p = \frac{C \times Q \times T}{P \times K}$$

(Equation 1)

Where:

E_p = Process-weighted mass emissions rate of PM or total metal HAP, pounds of PM or total metal HAP per ton (lb/ton) of metal charged;
C = Concentration of PM or total metal HAP measured during performance test run, grains per dry standard cubic foot (gr/dscf);
Q = Volumetric flow rate of exhaust gas, dry standard cubic feet per hour (dscf/hr);
T = Total time during a test run that a sample is withdrawn from the stack during melt production cycle, hr;
P = Total amount of metal charged during the test run, tons; and

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

K = Conversion factor, 7,000 grains per pound.

e. To determine compliance with an emissions limit for situations when multiple sources are controlled by a single control device, but only one source operates at a time or other situations that are not expressly considered in 40 CFR 63.10898(d) through (f), the permittee shall submit a site-specific test plan to the Division for approval according to the requirements in 40 CFR 63.7(c)(2) and (3). [40 CFR 63.10898(g)]

f. The permittee shall conduct each opacity test for fugitive emissions according to the requirements in 40 CFR 63.6(h)(5) and Table 1 to 40 CFR 63, Subpart ZZZZZ. [40 CFR 63.10898(h)]

g. The permittee shall conduct subsequent performance tests to demonstrate compliance with the opacity limit in 40 CFR 63.10895(e) no less frequently than every 6 months and each time a process change likely to increase fugitive emissions in made. [40 CFR 63.10898(i)]

h. In the performance test report, the permittee shall certify that the capture system operated normally during the performance test. [40 CFR 63.10898(j)]

i. For each metal melting furnace subject to a PM limit in 40 CFR 63.10895(c), the permittee shall: [40 CFR 63, Subpart ZZZZZ, Table 1(1)]
   i. Select sampling port locations and the number of traverse points in each stack or duct using EPA Method 1 or 1A (40 CFR part 60, appendix A). Sampling sites must be located at the outlet of the control device (or at the outlet of the emissions source if no control device is present) prior to any releases to the atmosphere. [40 CFR 63, Subpart ZZZZZ, Table 1(1)(a)]
   ii. Determine volumetric flow rate of the stack gas using Method 2, 2A, 2C, 2D, 2F, or 2G (40 CFR part 60, appendix A). [40 CFR 63, Subpart ZZZZZ, Table 1(1)(b)]
   iii. Determine dry molecular weight of the stack gas using EPA Method 3, 3A, or 3B (40 CFR part 60, appendix A). The permittee may also use as an alternative to EPA Method 3B (40 CFR part 60, appendix A), the manual method for measuring the oxygen, carbon dioxide, and carbon monoxide content of exhaust gas, ANSI/ASME PTC 19.10-1981, "Flue and Exhaust Gas Analyses" (incorporated by reference—see 40 CFR 63.14). [40 CFR 63, Subpart ZZZZZ, Table 1(1)(c)]
   iv. Measure moisture content of the stack gas using EPA Method 4 (40 CFR part 60, A). [40 CFR 63, Subpart ZZZZZ, Table 1(1)(d)]
   v. Determine PM concentration using EPA Method 5, 5B, 5D, 5F, or 5I, as applicable (40 CFR part 60, appendix A). [40 CFR 63, Subpart ZZZZZ, Table 1(1)(e)]
      1) Collect a minimum sample volume of 60 dscf of gas during each PM sampling run. The PM concentration is determined using only the front-half (probe rinse and filter) of the PM catch. [40 CFR 63, Subpart ZZZZZ, Table 1(1)(i)]
   vi. A minimum of three valid test runs are needed to comprise a PM performance test. [40 CFR 63, Subpart ZZZZZ, Table 1(1)(iii)]
   vii. Sample PM only during normal melt production conditions, which may include, but are not limited to the following operations: Charging, melting, alloying, refining, slagging, and tapping. [40 CFR 63, Subpart ZZZZZ, Table 1(1)(v)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

viii. Determine and record the total combined weight of tons of metal charged during the duration of each test run. The permittee shall compute the process-weighted mass emissions of PM according to Equation 1 of 40 CFR 63.10898(d) for an individual furnace. [40 CFR 63, Subpart ZZZZZ, Table 1(1)(vi)]

j. For fugitive emissions from buildings or structures housing any iron and steel foundry emissions sources subject to opacity limit in 40 CFR 63.10895(e), the permittee shall: [40 CFR 63, Subpart ZZZZZ, Table 1(2)]
   i. Using a certified observer, conduct each opacity test according to EPA Method 9 (40 CFR part 60, appendix A-4) and 40 CFR 63.6(h)(5). [40 CFR 63, Subpart ZZZZZ, Table 1(2)(a)]
      1) The certified observer may identify a limited number of openings or vents that appear to have the highest opacities and perform opacity observations on the identified openings or vents in lieu of performing observations for each opening or vent from the building or structure. Alternatively, a single opacity observation for the entire building or structure may be performed, if the fugitive release points afford such an observation. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(a)(i)]
      2) During testing intervals when PM performance tests are being conducted, conduct the opacity test such that the opacity observations are recorded during the PM performance tests. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(a)(ii)]
   ii. As alternative to Method 9 performance test, conduct visible emissions test by Method 22 (40 CFR part 60, appendix A-7). The test is successful if no visible emissions are observed for 90 percent of the readings over 1 hour. If VE is observed greater than 10 percent of the time over 1 hour, then the facility must conduct another performance test as soon as possible, but no later than 15 calendar days after the Method 22 test, using Method 9 (40 CFR part 60, appendix A-4). [40 CFR 63, Subpart ZZZZZ, Table 1(2)(b)]
      1) The observer may identify a limited number of openings or vents that appear to have the highest visible emissions and perform observations on the identified openings or vents in lieu of performing observations for each opening or vent from the building or structure. Alternatively, a single observation for the entire building or structure may be performed, if the fugitive release points afford such an observation. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(b)(i)]
      2) During testing intervals when PM performance tests are being conducted, conduct the visible emissions test such that the observations are recorded during the PM performance tests. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(b)(ii)]

k. Except as provided in 401 KAR 50:045, performance tests used to demonstrate compliance with 401 KAR 59:010, Section 3 shall be conducted according to the following methods. Kentucky Methods 50 and 150(F-1) and other methods are filed by reference in 401 KAR 50:015. [401 KAR 59:010, Section 4]
   i. Reference Method 5 for the emission rates of particulate matter and the associated moisture content. [401 KAR 59:010, Section 4(1)]
   ii. Reference Method 1 for sample and velocity traverses. [401 KAR 59:010, Section 4(2)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

iii. Reference Method 2 for velocity and volumetric flow rate. [401 KAR 59:010, Section 4(3)]
iv. Reference Method 3 for gas analysis. [401 KAR 59:010, Section 4(4)]
v. Reference Method 9 for opacity of continuous emissions. [401 KAR 59:010, Section 4(5)]
vi. For Reference Method 5, Reference Method 1 shall be used to select the sampling site and the number of traverse sampling points. The sampling time for each run shall be at least sixty (60) minutes and the minimum sample volume shall be 0.85 dscm (thirty (30) dscf) except that smaller sampling time or volumes, when necessitated by process variables or other factors, may be approved by the Cabinet. [401 KAR 59:010, Section 4(7)]

l. The permittee shall, within 180 days of permit issuance~~after startup of EU07, EU08, EU09, and EU10,~~ verify the direction of airflow through both the largest building wall opening closest to the process and the largest opening of each hood and exhaust pickup point, is inward using a smoke tube and the following procedures: [401 KAR 51:017]
   i. The direction of airflow shall be monitored for at least 1 hour, with checks made no more than 10 minutes apart.
   ii. The ~~fan RPM and~~ volumetric flow rate shall be monitored during the test.

m. Pursuant to 401 KAR 59:005, Section 2(2) and 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.

n. Refer to **SECTION D** for group testing requirements.

4. Specific Monitoring Requirements:

a. The permittee shall make monthly inspections of the equipment that is important to the performance of the total capture system (i.e., pressure sensors, dampers, and damper switches). This inspection shall include observations of the physical appearance of the equipment (e.g., presence of holes in the ductwork or hoods, flow constrictions caused by dents or accumulated dust in the ductwork, and fan erosion). The permittee shall repair any defect or deficiency in the capture system as soon as practicable, but no later than 90 days. The permittee shall record the date and results of each inspection and the date of repair of any defect or deficiency. [40 CFR 63.10897(e)]

~~b. The permittee shall install, operate, and maintain each CPMS or other measurement device according to the O&M plan. The permittee shall record all information needed to document conformance with these requirements. [40 CFR 63.10897(f)]~~

Commented [CS8]: There is no CPMS or other measurement device requirements by the rule.

~~c.~~b. In the event of an exceedance of an established emissions limitation (including an operating limit), the permittee shall restore operation of the emissions source (including the control device and associated capture system) to its normal or usual manner or operation as expeditiously as practicable in accordance with good air pollution control practices for minimizing emissions. The response shall include minimizing the period of any startup, shutdown or malfunction and taking any necessary corrective actions to

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

restore normal operation and prevent the likely recurrence of the exceedance. The permittee shall record the date and time correction action was initiated, the correction action taken, and the date corrective action was completed. [40 CFR 63.10897(g)]

~~d. The permittee shall perform a qualitative visual observation of the opacity of emissions at each stack daily and maintain a log of the observations. If visible emissions from a stack are seen (not including condensed water in the plume), then an inspection of process/control equipment shall be initiated and corrective action taken. If visible emissions are present after the corrective action, the process(s) shall be shut down and shall not operate again until repairs have been made that result in no visible emissions from the process(s) during operation. In lieu of shutting the process(s) down, the permittee may determine the opacity using Reference Method 9. If the opacity limit is not exceeded, the process(s) may continue to operate. [401 KAR 51:017]~~

Commented [CS9]: There are no fugitive egress point stacks and the baghouse has a BLDS installed, therefore a daily qualitative visual observation should not be required.

~~e.~~c. For each emission unit listed above, the permittee shall monitor the following parameters:

i. Monthly and 12-month rolling total hours of operation;
ii. Monthly and 12-month rolling total throughput;

~~f.~~d. Refer to **SECTION E**.

5. Specific Recordkeeping Requirements:

a. In addition to the records required by 40 CFR 63.10(b)(2)(iii) and (vi) through (xiv) and (b)(3), the permittee shall keep records of the information specified in 40 CFR 63.10899(b)(1) through (13). [40 CFR 63.10899(b)]

Commented [CS10]: Below is incomplete list of requirements identified by 40 CFR 63.10899(b). It would improve the permit as stated by removing all Subpart ZZZZZ related language and have the requirements be global in nature. Otherwise all applicable requirements should be identified.

i. The permittee shall keep records of monthly metal melt production for each calendar year. [40 CFR 63.10899(b)(6)]
ii. The permittee shall keep a copy of the operation and maintenance plan as required by 40 CFR 63.10896(a) and records that demonstrate compliance with plan requirements. [40 CFR 63.10899(b)(7)]
iii. If emissions averaging is used, the permittee shall keep records of the monthly metal melting rate for each furnace at the iron and steel foundry, and records of the calculated pounds of PM or total metal HAP per ton of metal melted for the group of all metal melting furnaces required by 40 CFR 63.10897(h). [40 CFR 63.10899(b)(8)]
iv. The permittee shall keep records for bag leak detection systems as follows: [40 CFR 63.10899(b)(9)]
    1) Records of the bag leak detection system output; [40 CFR 63.10899(b)(9)(i)]
    2) Records of bag leak detection system adjustments, including the date and time of the adjustment, the initial bag leak detection system settings, and the final bag leak detection system settings; and [40 CFR 63.10899(b)(9)(ii)]
    3) The date and time of all bag leak detection system alarms, and for each valid alarm, the time corrective action was initiated, the corrective action taken, and the date on which corrective action was completed. [40 CFR 63.10899(b)(9)(iii)]
v. The permittee shall keep records of capture system inspections and repairs as required by 40 CFR 63.10897(e). [40 CFR 63.10899(b)(10)]
vi. The permittee shall keep records demonstrating conformance with the specifications for the operation of CPMS as required by 40 CFR 63.10897(f). [40 CFR 63.10899(b)(11)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

vii. The permittee shall keep records of corrective action(s) for exceedances and excursions as required by 40 CFR 63.10897(g). [40 CFR 63.10899(b)(12)]

viii. The permittee shall record the results of each inspection and maintenance required by 40 CFR 63.10897(a) for PM control devices in a logbook (written or electronic format). The permittee shall keep the logbook onsite and make the logbook available to the Division upon request. The permittee shall keep records of the information specified in 40 CFR 63.10899(b)(13)(i) through (iii). [40 CFR 63.10899(b)(13)]

1) The date and time of each recorded action for a fabric filter, the results of each inspection, and the results of any maintenance performed on the bag filters. [40 CFR 63.10899(b)(13)(i)]

~~b.~~ The permittee shall record the occurrence, duration, cause and any corrective action taken for any incident or malfunction that occurs that causes or might cause an exceedance of the particulate emission or opacity standard when an emission unit is in operation. ~~A log of Method 9 observations and qualitative visual observations shall be kept and made available for inspection.~~

Commented [CS11]: Baghouse has a BLDS and semiannual opacity standard. An additional log is unnecessary.

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~~c.~~b. For each emission unit listed above, the permittee shall maintain records of the following:

i. Monthly and 12-month rolling total hours of operation;
ii. Monthly and 12-month rolling total throughput;
iii. SDSs for all materials used.

~~d.~~c. The permittee shall maintain records of the calculations required in **SECTION D**.

6. Specific Reporting Requirements:

a. The permittee shall submit semiannual compliance reports to the Division according to the requirements in 40 CFR 63.10(e). The reports shall include, at a minimum, the following information as applicable: [40 CFR 63.10899(c)]

i. Summary information on the number, duration, and cause (including unknown cause, if applicable) of excursions or exceedances, as applicable, and the corrective action taken; [40 CFR 63.10899(c)(1)]

ii. Summary information on the number, duration, and cause (including unknown cause, if applicable) for monitor downtime incidents (other than downtime associated with zero and span or other calibration checks, if applicable); and [40 CFR 63.10899(c)(2)]

iii. Summary information on any deviation from the pollution prevention management practices in 40 CFR 63.10885 and 63.10886 and the operation and maintenance requirements 40 CFR 63.10896 and the corrective action taken. [40 CFR 63.10899(c)(3)]

Commented [CS12]: This language should either be removed if addressing Subpart ZZZZZ at the facility level or changed to reflect the revised Subpart ZZZZZ RTR requirements.

~~b. The notification of compliance status required by 40 CFR 63.9(h) shall include this certification of compliance, signed by a responsible official: [40 CFR 63, Subpart ZZZZZ, Table 4]~~

~~i. "This facility operates a capture and collection system for each emissions source subject to this subpart according to 40 CFR 63.10895(b)."~~

Commented [CS13]: Notification of Compliance Status has been submitted.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

~~ii. "This facility complies with the PM emissions limit in 40 CFR 63.10895(e) for each metal melting furnace based on a previous performance test in accordance with 40 CFR 63.10898(a)(1)."~~

~~iii. "This facility has prepared and will operate by an operation and maintenance plan according to 40 CFR 63.10896(a)."~~

~~iv. "This facility has prepared and will operate by a site-specific monitoring plan for each bag leak detection system and submitted the plan to the Division for approval according to 40 CFR 63.10897(d)(2)."~~

~~c. The permittee shall, within 90 days after conducting the initial performance test, submit the design information and analysis, with supporting documentation, demonstrating that each capture and collection system (hood, canopy, open entrance, etc.) meets accepted engineering standards, such as those published by the American Conference of Governmental Industrial Hygienists, and is capable of meeting the capture effieiency requirement in **1. Operating Limitations (f).** [401 KAR 51:017]~~

7. Specific Control Equipment Operating Conditions:

a. For all emission units listed above, the permittee shall install, calibrate, maintain and operate, according to manufacturer's specifications, fabric filters designed to achieve the BACT limits in **SECTION D(5)**. The permittee shall make these records of the manufacturer's specification for the fabric filters available for inspection by the Division. [401 KAR 51:017]

b. Refer to **SECTION E** for control device requirements pursuant to 40 CFR 63, Subpart ZZZZZ and 401 KAR 51:017.

c. The permittee shall operate the control devices associated with each emission unit at all times that the emission unit is operating. [401 KAR 51:017]

d. For the baghouse associated with EU07, EU08, EU09, and EU10, the permittee shall continuously monitor the inlet volumetric flow rate in the stack, and maintain it at 80% or above the level measured during the testing required by **3. Testing Requirements (l)**.

e. The permittee shall install, calibrate, maintain and operate, according to manufacturer's specifications (as applicable), a monitoring device (differential pressure gauges or manometers) to determine the pressure drop across each baghouse, at a minimum, once a day~~shift~~ during the operation of the unit. A permanent label displaying the operating range established for each baghouse shall be posted next to the selected instrument. [401 KAR 51:017]

Commented [CS14]: Comment made because certain pressure monitoring devices cannot be calibrated.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Foundry Operations

Emission Unit	Description	BACT Control Device	Maximum Hourly Capacity	PSD Operating Limitations	Maximum Burner Capacity	Estimated Start of Construction
Emission Group 01 – Melt Shop						
EU01	Scrap Steel Storage	None	25.3 ton gray iron/hr, each	91,586 ton gray iron/yr	N/A	August 2016
EU02	Alloy Storage	Baghouse (CU01)		91,586 ton gray iron/yr	N/A	August 2016
EU03	Scrap Drying	None		60.12 MMscf/yr	7 MMBtu/hr	August 2016
EU04	Scrap Cleaning	Baghouse (CU01)		91,586 ton gray iron/yr & 120.24 MMscf/yr	14 MMBtu/hr	August 2016
EU05	Refractory Burner #1	None	N/A	73 MMscf/yr	8.50 MMBtu/hr	August 2016
EU06	Refractory Burner #2	None	N/A	73 MMscf/yr	8.50 MMBtu/hr	March 2019
EU11	Holding Furnace #1	Baghouse (CU01)	12.7 ton gray iron/hr, each	45,793 ton gray iron/yr & 24.99 MMscf/yr	2.91 MMBtu/hr	August 2016
EU12	Holding Furnace #2			45,793 ton gray iron/yr & 24.99 MMscf/yr	2.91 MMBtu/hr	March 2019
EU13	Transport Ladle #1	None		45,793 ton gray iron/yr	N/A	August 2016
EU14	Transport Ladle #2	None		45,793 ton gray iron/yr	N/A	March 2019
EU15	Pouring Furnace #1	Baghouse (CU01)		45,793 ton gray iron/yr & 24.99 MMscf/yr	2.91 MMBtu/hr	August 2016
EU16	Pouring Furnace #2			45,793 ton gray iron/yr & 24.99 MMscf/yr	2.91 MMBtu/hr	March 2019
EU17	Melt Shop Baghouse Waste Dust Silo	Bin Vent Filter (CU02)	25.3 ton gray iron/hr	91,586 ton gray iron/yr	N/A	August 2016
EU18	Refractory Curing Mobile Burner	None	N/A	17.18 MMscf/yr	2.00 MMBtu/hr	August 2016
Emission Group 02 – Sand Plant						
EU19	Mold Silica Sand Silo	Bin Vent Filter (CU03)	197 ton mold sand/hr	711,986 ton mold sand/yr	N/A	August 2016

Commented [CS15]: Need to create group limits (for all applicable emission units) when multiple identical emission units have PSD Operating Limitation that evenly divide the throughput rate.

Commented [CS16]: See Attachment #1 - Emission Unit Number, Description and Control Device
See Permit Calculations for Maximum Hourly Capacity
See Permit Application for Estimated Start Date

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Unit	Description	BACT Control Device	Maximum Hourly Capacity	PSD Operating Limitations	Maximum Burner Capacity	Estimated Start of Construction
EU20	Blend Silo	Bin Vent Filter (CU04)	1.15 ton blend/hr	4,179 ton blend/yr	N/A	August 2016
EU21	Bentonite Silo	Bin Vent Filter (CU05)	0.16 ton bentonite/hr	595 ton bentonite/yr	N/A	August 2016
EU22	Mold Silica Sand Bin	Baghouse (CU06)	197 ton mold sand/hr	711,986 ton mold sand/yr	N/A	August 2016
EU23	Blend Bin		1.15 ton blend/hr	4,179 ton blend/yr	N/A	August 2016
EU24	Bentonite Bin		0.16 ton bentonite/hr	595 ton bentonite/yr	N/A	August 2016
EU26	Mold Silica Sand Weigh Hopper		197 ton mold sand/hr	711,986 ton mold sand/yr	N/A	August 2016
EU27	Blend Weigh Hopper		1.15 ton blend/hr	4,179 ton blend/yr	N/A	August 2016
EU28	Bentonite Weigh Hopper		0.16 ton bentonite/hr	595 ton bentonite/ yr	N/A	August 2016
EU29	Dust Weigh Hopper		2.80 ton waste sand/hr	10,149 ton waste sand/yr	N/A	August 2016
EU30	Green Sand Mixer #1		66.0 ton green sand/hr, each	237,329 ton green sand/yr	N/A	August 2016
EU31	Green Sand Mixer #2			237,329 ton green sand/yr	N/A	August 2016
EU32	Green Sand Mixer #3			237,329 ton green sand/yr	N/A	March 2019
EU33	Mold Stamping #1	Baghouse (CU08)*	99.0 ton green sand/hr, each	358,380 ton green sand/yr	N/A	August 2016
EU34	Mold Stamping #2			358,380 ton green sand/yr	N/A	March 2019
EU35A	Core Silica Sand Silo A	Bin Vent Filter (CU18)	1.85 ton core sand/hr, each	6,690 ton core sand/yr, each	N/A	August 2016
EU35B	Core Silica Sand Silo B	Bin Vent Filter (CU19)		6,690 ton core sand/yr, each	N/A	March 2019
EU36	Sand Classifier	Baghouse (CU08)*	3.70 ton core sand/hr, each	13,380 ton core sand/yr	N/A	August 2016
EU37	Core Silica Sand Bin			13,380 ton core sand/yr	N/A	August 2016
EU38	Core Silica Sand Weigh Hopper			13,380 ton core sand/yr	N/A	August 2016

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Unit	Description	BACT Control Device	Maximum Hourly Capacity	PSD Operating Limitations	Maximum Burner Capacity	Estimated Start of Construction
EU39	Core Machine #1	Sulfuric Acid Scrubber (CU07)	1.98 lb amine gas/hr; 4.2 lb release agent/hr; 34 lb binder/ hr, each	3.58 ton amine gas/yr; 7.70 ton release agent/yr; 60.2 ton binder/yr	N/A	August 2016
EU40	Core Machine #2			3.58 ton amine gas/yr; 7.70 ton release agent/yr; 60.2 ton binder/yr	N/A	August 2016
EU41	Core Machine #3			3.58 ton amine gas/yr; 7.70 ton release agent/yr; 60.2 ton binder/yr	N/A	March 2019
EU42	Core Machine #4			3.58 ton amine gas/yr; 7.70 ton release agent/yr; 60.2 ton binder/yr	N/A	March 2019
EU43	Core Removal	Baghouse (CU08)*	3.70 ton core sand/hr	13,380 ton core sand/yr	N/A	August 2016
EU44	Dryer #1		32 lb coating/hr; 34 lb binder/hr, each	34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	August 2016
EU45	Dryer #2			34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	August 2016
EU46	Dryer #3			34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	March 2019
EU47	Dryer #4			34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	March 2019
EU54	Sand Cooler	Baghouse (CU06)	194 ton recycled sand/hr, each	700,934 ton recycled sand/yr	N/A	August 2016
EU55	Used Mold & Core Sand Storage			700,934 ton recycled sand/yr	N/A	August 2016
EU56	Sand Screening		202 ton total used sand/hr, each	730,140 ton total used sand/yr	N/A	August 2016
EU57	Sand Plant Waste Sand Silo	Bin Vent Filter (CU10)		730,140 ton total used sand/yr	N/A	August 2016
Emission Group 03 – Casting & Molding						
EU48	Mold Assembly #1	Baghouse (CU08)*	100.8 ton total used sand/hr, each	365,070 ton total used sand/yr	N/A	August 2016
EU49	Mold Assembly #2			365,070 ton total used sand/yr	N/A	March 2019

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Unit	Description	BACT Control Device	Maximum Hourly Capacity	PSD Operating Limitations	Maximum Burner Capacity	Estimated Start of Construction
EU50	Pouring #1	Baghouse (CU08)*	12.7 ton gray iron/hr, each	45,793 ton gray iron/yr	N/A	August 2016
EU51	Pouring #2			45,793 ton gray iron/yr	N/A	March 2019
EU52	Cooling Tunnel		25.3 ton gray iron/hr, each	91,586 ton gray iron/yr & 8.59 MMscf/yr	1 MMBtu/hr	August 2016
EU53	Shakeout Conveyor	Baghouse (CU06)		91,586 ton gray iron/yr	N/A	August 2016
EU58	Mold Shop Baghouse Waste Dust Silo	Bin Vent Filter (CU09)		91,586 ton gray iron/yr	N/A	August 2016
EU59	Forced Air Cooler	Baghouse (CU08)*		91,586 ton gray iron/yr	N/A	August 2016
Emission Group 04 – Fettling Shop						
EU60	Sorting	Baghouse (CU11)	25.3 ton gray iron/hr	91,586 ton gray iron/yr	N/A	August 2016
EU61	Steel Shot Blasting #1		4.40 lb shot/hr, each	15,928 lb shot/yr	N/A	August 2016
EU62	Steel Shot Blasting #2			15,928 lb shot/yr	N/A	March 2019
EU63	Fettling Baghouse Waste Dust Silo	Bin Vent Filter (CU12)	25.3 ton gray iron/hr	91,586 ton gray iron/yr	N/A	August 2016
EU64	Grinding #1	Baghouse (CU11)	12.7 ton gray iron/hr, each	45,793 ton gray iron/yr	N/A	August 2016
EU65	Grinding #2			45,793 ton gray iron/yr	N/A	March 2019
Emission Group 05 – Machining Shop						
EU66	Turning Lathes (8)	Cartridge Filters (CU13a thru h)	25.3 ton gray iron/hr, each	91,586 ton gray iron/yr	N/A	August 2016
EU67	Drilling & Milling (2)	Cartridge Filters (CU13i & j)		91,586 ton gray iron/yr	N/A	August 2016

~~*Note: The CU08 Baghouse will not be constructed until Phase 2 of construction. During Phase 1, all processes that would have been ducted to CU08 will be ducted to CU01. Refer to **Section H** for more details.~~

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Description: The processes listed above are considered to meet the definition of Foundry Operations, as defined in 40 CFR 63.10906, which means all process equipment and practices used to produce metal castings for shipment, including: Mold or core making and coating; scrap handling and preheating; metal melting and inoculation; pouring, cooling, and shakeout; shotblasting, grinding, and other metal finishing operations; and sand handling.

APPLICABLE REGULATIONS:
401 KAR 51:017, Prevention of significant deterioration of air quality.
401 KAR 59:010, New process operations.
401 KAR 63:002, Section 2(4)(bbbbb) implementing **40 CFR 63, Subpart ZZZZZ,** *National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries Area Sources.*

1. **Operating Limitations:**
   a. For each segregated metallic scrap storage area, bin or pile, the permittee shall comply with the materials acquisition requirements in 40 CFR 63.10885(a)(1) or (2). The permittee shall keep a copy of the material specifications onsite and readily available to all personnel with material acquisition duties, and provide a copy to each of the scrap providers. The permittee may have certain scrap subject to 40 CFR 63.10885(a)(1) and other scrap subject to 40 CFR 63.10885(a)(2) at the facility provided the metallic scrap remains segregated until charge make-up. [40 CFR 63.10885(a)]
      i. The permittee shall prepare and operate at all times according to written material specifications for the purchase and use of only metal ingots, pig iron, slitter, or other materials that do not include post-consumer automotive body scrap, post-consumer engine blocks, post-consumer oil filters, oily turnings, lead components, chlorinated plastics, or free liquids. For the purpose of 40 CFR 63, Subpart ZZZZZ, "free liquids" is defined as material that fails the paint filter test by EPA Method 9095B, "Paint Filter Liquids Test" (revision 2), November 2004 (incorporated by reference—see 40 CFR 63.14). The requirements for no free liquids do not apply if the permittee can demonstrate that the free liquid is water that resulted from scrap exposure to rain. [40 CFR 63.10885(a)(1)]
      ii. The permittee shall prepare and operate at all times according to written material specifications for the purchase and use of only iron and steel scrap that has been depleted (to the extent practicable) of organics and HAP metals in the charge materials used by the iron and steel foundry. The materials specifications shall include at minimum the information specified in 40 CFR 63.10885(a)(2)(i). [40 CFR 63.10885(a)(2)]
         1) Specifications for metallic scrap materials charged to a scrap preheater or metal melting furnace to be depleted (to the extent practicable) of the presence of used oil filters, chlorinated plastic parts, accessible lead-containing components (such as batteries and wheel weights), and a program to ensure the scrap materials are drained of free liquids. [40 CFR 63.10885(a)(2)(i)]

   b. For scrap containing motor vehicle scrap, the permittee shall procure the scrap pursuant to one of the compliance options in 40 CFR 63.10885(b)(1), (2), or (3) for each scrap provider, contract, or shipment. For scrap that does not contain motor vehicle scrap, the permittee shall procure the scrap pursuant to the requirements in 40 CFR 63.10885(b)(4)

Commented [CS17]: To clarify these requirements are for Charge Handling or Melting. The Charge Handling emission unit should be its own Grouping or grouped with the furnaces. These requirements should be relocated to either the facility-level or to the Melting Group as they are confusing where they are.

Commented [CS18]: See above comment.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

for each scrap provider, contract, or shipment. The permittee may have one scrap provider, contract, or shipment subject to one compliance provision and others subject to another compliance provision. [40 CFR 63.10885(b)]

i. Site-specific plan for mercury switches. The permittee shall comply with the requirements in 40 CFR 63.10885(b)(1)(i) through (v). [40 CFR 63.10885(b)(1)]
   1) The permittee shall include a requirement in the scrap specifications for removal of mercury switches from vehicle bodies used to make the scrap. [40 CFR 63.10885(b)(1)(i)]
   2) The permittee shall prepare and operate according to a plan demonstrating how the facility will implement the scrap specification in 40 CFR 63.10885(b)(1)(i) for removal of mercury switches. The permittee shall submit the plan to the Division for approval. The permittee shall operate according to the plan as submitted during the review and approval process, operate according to the approved plan at all times after approval, and address any deficiency identified by the Division within 60 days following disapproval of a plan. The permittee may request approval to revise the plan and may operate according to the revised plan unless and until the revision is disapproved by the Division. The Division may change the approval status of the plan upon 90-days written notice based upon the semiannual report or other information. The plan shall include: [40 CFR 63.10885(b)(1)(ii)]
      A. A means of communicating to scrap purchasers and scrap providers the need to obtain or provide motor vehicle scrap from which mercury switches have been removed and the need to ensure the proper management of the mercury switches removed from the scrap as required under the rules implementing subtitle C of the Resource Conservation and Recovery Act (RCRA) (40 CFR parts 261 through 265 and 268). The plan shall include documentation of direction to appropriate staff to communicate to suppliers throughout the scrap supply chain the need to promote the removal of mercury switches from end- of-life vehicles. Upon the request of the Division, the permittee shall provide examples of materials that are used for outreach to suppliers, such as letters, contract language, policies for purchasing agents, and scrap inspection protocols; [40 CFR 63.10885(b)(1)(ii)(A)]
      B. Provisions for obtaining assurance from scrap providers motor vehicle scrap provided to the facility meet the scrap specification; [40 CFR 63.10885(b)(1)(ii)(B)]
      C. Provisions for periodic inspections or other means of corroboration to ensure that scrap providers and dismantlers are implementing appropriate steps to minimize the presence of mercury switches in motor vehicle scrap and that the mercury switches removed are being properly managed, including the minimum frequency such means of corroboration will be implemented; and [40 CFR 63.10885(b)(1)(ii)(C)]
      D. Provisions for taking corrective actions (i.e., actions resulting in scrap providers removing a higher percentage of mercury switches or other mercury-containing components) if needed, based on the results of procedures implemented in 40 CFR 63.10885(b)(1)(ii)(C). [40 CFR 63.10885(b)(1)(ii)(D)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

3) The permittee shall require each motor vehicle scrap provider to provide an estimate of the number of mercury switches removed from motor vehicle scrap sent to the facility during the previous year and the basis for the estimate. The Division may request documentation or additional information at any time. [40 CFR 63.10885(b)(1)(iii)]
4) The permittee shall establish a goal for each scrap supplier to remove at least 80 percent of the mercury switches. Although a site-specific plan approved under 40 CFR 63.10885(b)(1) may require only the removal of convenience light switch mechanisms, the Division will credit all documented and verifiable mercury-containing components removed from motor vehicle scrap (such as sensors in anti-locking brake systems, security systems, active ride control, and other applications) when evaluating progress towards the 80 percent goal. [40 CFR 63.10885(b)(1)(iv)]
5) For each scrap provider, the permittee shall submit semiannual progress reports to the Division that provide the number of mercury switches removed or the weight of mercury recovered from the switches, the estimated number of vehicles processed, an estimate of the percent of mercury switches removed, and certification that the removed mercury switches were recycled at RCRA- permitted facilities or otherwise properly managed pursuant to RCRA subtitle C regulations referenced in 40 CFR 63.10885(b)(1)(ii)(A). This information can be submitted in aggregate form and does not have to be submitted for each shipment. The Division may change the approval status of a site-specific plan following 90- day's notice based on the progress reports or other information. [40 CFR 63.10885(b)(1)(v)]

~~ii. The permittee shall certify in the notification of compliance status that the permittee participates in and purchases motor vehicle scrap only from scrap providers who participate in a program for removal of mercury switches that has been approved by the U.S. EPA based on the criteria in 40 CFR 63.10885(b)(2)(i) through (iii). If the permittee purchases motor vehicle scrap from a broker, the permittee shall certify that all scrap received from that broker was obtained from other scrap providers who participate in a program for the removal of mercury switches that has been approved by the U.S. EPA based on the criteria in 40 CFR 63.10885(b)(2)(i) through (iii). The National Mercury Switch Recovery Program and the State of Maine Mercury Switch Removal Program are EPA-approved programs under 40 CFR 63.10885(b)(2) unless and until the U.S. EPA disapproves the program (in part or in whole) under 40 CFR 63.10885(b)(2)(iii). [40 CFR 63.10885(b)(2)]~~

~~1) The program includes outreach that informs the dismantlers of the need for removal of mercury switches and provides training and guidance for removing mercury switches; [40 CFR 63.10885(b)(2)(i)]~~
~~2) The program has a goal to remove at least 80 percent of mercury switches from motor vehicle scrap the scrap provider processes. Although a program approved under 40 CFR 63.10885(b)(2) may require only the removal of convenience light switch mechanisms, the U.S. EPA will credit all documented and verifiable mercury containing components removed from motor vehicle scrap (such as sensors in anti-locking brake systems, security systems, active ride control, and~~

Commented [CS19]: The NOCS has already been submitted.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

other applications) when evaluating progress towards the 80 percent goal; and [40 CFR 63.10885(b)(2)(ii)]

3) The program sponsor agrees to submit progress reports to the U.S. EPA no less frequently than once every year that provide the number of mercury switches removed or the weight of mercury recovered from the switches, the estimated number of vehicles processed, an estimate of the percent of mercury switches recovered, and certification that the recovered mercury switches were recycled at facilities with permits as required under the rules implementing subtitle C of RCRA (40 CFR parts 261 through 265 and 268). The progress reports must be based on a database that includes data for each program participant; however, data may be aggregated at the State level for progress reports that will be publicly available. The U.S. EPA may change the approval status of a program or portion of a program (e.g., at the State level) following 90-days notice based on the progress reports or on other information. [40 CFR 63.10885(b)(2)(iii)]

4) The permittee shall develop and maintain onsite a plan demonstrating the manner through which the facility is participating in the EPA-approved program. [40 CFR 63.10885(b)(2)(iv)]

A. The plan shall include facility-specific implementation elements, corporate-wide policies, and/or efforts coordinated by a trade association as appropriate for each facility. [40 CFR 63.10885(b)(2)(iv)(A)]

B. The permittee shall provide in the plan documentation of direction to appropriate staff to communicate to suppliers throughout the scrap supply chain the need to promote the removal or mercury switches from end-of-life vehicles. Upon the request of the U.S. EPA or the Division, the permittee shall provide examples of materials that are used for outreach to suppliers, such as letters, contract language, policies for purchasing agents, and scrap inspection protocols. [40 CFR 63.10885(b)(2)(iv)(B)]

C. The permittee shall conduct periodic inspections or other means of corroboration to ensure that scrap providers are aware of the need for and are implementing appropriate steps to minimize the presence of mercury in scrap from end-of life vehicles. [40 CFR 63.10885(b)(2)(iv)(C)]

iii. The permittee shall certify in the notification of compliance status and maintain records of documentation that the only materials from motor vehicles in the scrap are materials recovered for their specialty alloy (including, but not limited to, chromium, nickel, molybdenum, or other alloys) content (such as certain exhaust systems) and, based on the nature of the scrap and purchase specifications, that the type of scrap is not reasonably expected to contain mercury switches. [40 CFR 63.10885(b)(3)]

iv. For scrap not subject to the requirements in 401 CFR 63.10885(b)(1) through (3), the permittee shall certify in the notification of compliance status and maintain records of documentation that this scrap does not contain motor vehicle scrap. [40 CFR 63.10885(b)(4)]

c. The permittee shall comply with the pollution prevention management practices in 40 CFR 63.10885 and 63.10886, the requirements in 40 CFR 63.10895(b) through (e), and the requirements in 40 CFR 63.10896 through 63.10900. [40 CFR 63.10895(a)]

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SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

d. The permittee shall prepare and operate at all times according to a written operation and maintenance (O&M) plan for each control device. The permittee shall maintain a copy of the O&M plan at the facility and make it available for review upon request. At a minimum, each plan shall contain the following information: [40 CFR 63.10896(a)]
   i. General facility and contact information; [40 CFR 63.10896(a)(1)]
   ii. Positions responsible for inspecting, maintaining, and repairing emissions control devices which are used to comply with 40 CFR 63, Subpart ZZZZZ; [40 CFR 63.10896(a)(2)]
   iii. Description of items, equipment, and conditions that will be inspected, including an inspection schedule for the items, equipment, and conditions. For baghouses that are equipped with bag leak detection systems, the O&M plan shall include the site- specific monitoring plan required in 40 CFR 63.10897(d)(2). [40 CFR 63.10896(a)(3)]
   iv. Identity and estimated quantity of the replacement parts that will be maintained in inventory; and [40 CFR 63.10896(a)(4)]
   v. Procedures for operating and maintaining a CPMS in accordance with manufacturer's specifications. [40 CFR 63.10896(a)(5)]

e. The permittee may use any other O&M, preventative maintenance, or similar plan which addresses the requirements in 40 CFR 63.10896(a)(1) through (5) to demonstrate compliance with the requirements for an O&M plan. [40 CFR 63.10896(b)]

f. The permittee shall not exceed the yearly operating limitations listed in the table above on a rolling 12-month basis. [401 KAR 51:017]

g. The permittee shall prepare and maintain for ~~EU03, EU04,~~ EU05, EU06, ~~EU11, EU12,~~ EU15, EU16, EU18, EU44, EU45, EU46, and EU47~~, and EU52,~~ within 90 days of startup, a good combustion and operation practices plan (GCOP) that defines, measures and verifies the use of operational and design practices determined as BACT for minimizing CO, VOC, PM, PM_{10}, and $PM_{2.5}$ emissions. Any revisions requested by the Division shall be made and the plan shall be maintained on site. The permittee shall operate according to the provisions of this plan at all times, including periods of startup, shutdown, and malfunction. The plan shall be incorporated into the plant standard operating procedures (SOP) and shall be made available for the Division's inspection. The plan shall include, but not be limited to: [401 KAR 51:017]
   i. A list of combustion optimization practices and a means of verifying the practices have occurred.
   ii. A list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred.
   iii. A list of the design choices determined to be BACT and verification that designs were implemented in the final construction.

Compliance Demonstration Method:
Refer to **4. Specific Monitoring Requirements, 5. Specific Recordkeeping Requirements, 6. Specific Reporting Requirements,** and **7. Specific Control Equipment Operating Conditions.**

Commented [CS21]: This requirement only applies to the melting furnaces. See definition of "control device" that states "...generated by a metal melting furnace"

Commented [CS22R21]: This should be removed from this section.

Commented [CS23]: This requirement only applies to the melting furnaces. See definition of "control device" that states "...generated by a metal melting furnace

Commented [CS24]: EU03 and EU04 will not be installed

Commented [CS25]: EU11 and EU12 will not be installed

Commented [CS26]: EU52 does not use fuel.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

h. The permittee shall operate a capture and collection system for each emission unit listed above to maintain negative pressure in the foundry. Each capture and collection system employed shall meet accepted engineering standards, such as those published by the American Conference of Governmental Industrial Hygienists. ~~Except for EU60, EU61, EU62, EU64, EU65, EU66, and EU67, each emission unit listed above shall maintain 100% capture efficiency at all times. EU60, EU61, EU62, EU64, EU65, EU66, and EU67 shall maintain 98% capture efficiency at all times.~~ [401 KAR 51:017]

~~i. The permittee shall ensure that the building removal efficiency for PM, PM_{10}, and $PM_{2.5}$ in the buildings that house the emission units listed above is at least 90%. [401 KAR 51:017]~~

Compliance Demonstration Method:
Compliance with **1. Operating Limitations (h)** and **(i)** shall be demonstrated by completing the testing in **3. Testing Requirements (i),** submitting the report required in **6. Specific Reporting Requirements (c),** and monitoring according to **7. Specific Control Reqirements (d).**

~~j.~~i. The permittee shall install ~~a~~two natural gas burners along the conveyor downstream of each~~the~~ pouring station (EU50 and EU51). These burners shall be oriented such that they ignite the vents of the mold assemblies in the event that they are not already burning. [401 KAR 51:017]

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~~k.~~j. The permittee shall operate and maintain the BACT control devices identified in the table above at all times that any associated process vented to the control device is operating. [401 KAR 51:017]

2. Emission Limitations:

a. The permittee shall not discharge to the atmosphere fugitive emissions from foundry operations that exhibit opacity greater than 20 percent (6-minute average), except for one 6-minute average per hour that does not exceed 30 percent. [40 CFR 63.10895(e); 401 KAR 51:017]

i. For the purposes of 40 CFR 63, Subpart ZZZZZ and the limit above: *Fugitive emissions* means any pollutant released to the atmosphere that is not discharged through a system of equipment that is specifically designed to capture pollutants at the source, convey them through ductwork, and exhaust them using forced ventilation. *Fugitive emissions* include pollutants released to the atmosphere through windows, doors, vents, or other building openings. *Fugitive emissions* also include pollutants released to the atmosphere through other general building ventilation or exhaust systems not specifically designed to capture pollutants at the source. [40 CFR 63.10906]

Compliance Demonstration Method:
Refer to **3. Testing Requirements, 4. Specific Monitoring Requirements, 5. Specific Recordkeeping Requirements, 6. Specific Reporting Requirements,** and **7. Specific Control Equipment Operating Conditions.**

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

b. The permittee shall not cause, suffer, allow, or permit any continuous (persisting more than 3 minutes) emission of particulate matter into the open air from a control device or stack associated with any affected facility which is equal to or greater than twenty (20) percent opacity, as measured by U.S. EPA Reference Method 9. [401 KAR 59:010, Section 3(1)(a); 401 KAR 51:017]

Compliance Demonstration Method:
Refer to **4. Monitoring Requirements(d)** for opacity compliance demonstration.

c. For emissions from a control device or stack no person shall cause, suffer, allow or permit the emission into the open air of particulate matter from any affected facility which is in excess of the following: [401 KAR 59:010, Section 3(2)]

i. For process weight rates of 0.50 ton/hr or less: 2.34 lb/hr
ii. For process weight rates up to 30 tons/hr: $E'_{PM_j} = 3.59P_j^{0.62}$
iii. For process weight rates greater than 30 tons/hr: $E'_{PM_j} = 17.31P_j^{0.16}$

Where:
j = Emission Unit;
E'_{PM_j} = The allowable particulate emission rate for unit j in pounds/hour;
P_j = The average process weight rate in tons/hour

Compliance Demonstration Method:
Compliance with the hourly particulate emission limitations in 401 KAR 59:010, Section 3(2) is assumed when compliance with the limitations in **2. Emission Limitations(d)** and **SECTION D(5)** is demonstrated and natural gas is used as fuel for combustion sources.

d. The permittee shall not emit to the atmosphere total PM, PM_{10}, and $PM_{2.5}$ emissions greater than the following: [401 KAR 51:017]

Emission Unit	Description	BACT Control Device	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
Emission Group 01 – Melt Shop					
~~EU03~~	~~Scrap Drying~~	~~None~~	~~0.013 lb/hr; 0.06 ton/yr~~	~~0.052 lb/hr; 0.23 ton/yr~~	~~0.052 lb/hr; 0.23 ton/yr~~
EU17	Melt and Core/Mold ~~Shop~~ Baghouse Waste Dust Silo	Bin Vent Filter (CU02)	0.0030 gr/dscf; 0.015 lb/hr; 0.06~~87~~ ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.06~~87~~ ton/yr	0.00301~~8~~ gr/dscf; 0.01~~509~~ lb/hr; 0.06~~840~~ ton/yr
Emission Group 02 – Sand Plant					
EU19	Mold Silica Sand Silo	Bin Vent Filter (CU03)	0.0030 gr/dscf; 0.015 lb/hr; 0.00~~167~~ ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.00~~167~~ ton/yr	0.00301~~8~~ gr/dscf; 0.01~~509~~ lb/hr; 0.00~~140~~

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SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

					ton/yr

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Unit	Description	BACT Control Device	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
EU20	Blend Silo	Bin Vent Filter (CU04)	0.0030 gr/dscf; 0.015 lb/hr; 0.00167 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.00167 ton/yr	0.00~~30~~18 gr/dscf; 0.01~~5~~09 lb/hr; 0.00140 ton/yr
EU21	Bentonite Silo	Bin Vent Filter (CU05)	0.0030 gr/dscf; 0.015 lb/hr; 0.00167 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.00167 ton/yr	0.00~~30~~18 gr/dscf; 0.01~~5~~09 lb/hr; 0.00140 ton/yr
EU35A	Core Silica Sand Silo A	Bin Vent Filter (CU19~~18~~)	0.0030 gr/dscf; 0.01~~5~~31 lb/hr; 0.00~~1~~135 ton/yr	0.0030 gr/dscf; 0.01~~5~~31 lb/hr; 0.00~~1~~135 ton/yr	0.00~~30~~18 gr/dscf; 0.00158 lb/hr; 0.00181 ton/yr
EU35B	Core Silica Sand Silo B	Bin Vent Filter (CU20~~19~~)	0.0030 gr/dscf; 0.01~~5~~31 lb/hr; 0.00~~1~~35 ton/yr	0.0030 gr/dscf; 0.01~~5~~31 lb/hr; 0.00~~1~~35 ton/yr	0.00~~30~~18 gr/dscf; 0.00158 lb/hr; 0.00181 ton/yr
EU57	Sand Plant Baghouse Waste Sand Silo	Bin Vent Filter (CU10)	0.0030 gr/dscf; 0.015 lb/hr; 0.06~~8~~7 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.06~~8~~7 ton/yr	0.00~~30~~18 gr/dscf; 0.009 lb/hr; 0.06~~8~~40 ton/yr
Emission Group 03 – Casting & Molding					
~~EU58~~	~~Mold Shop Baghouse Waste Dust Silo~~	~~Bin Vent Filter (CU09)~~	~~0.0030 gr/dscf; 0.015 lb/hr; 0.067 ton/yr~~	~~0.0030 gr/dscf; 0.015 lb/hr; 0.067 ton/yr~~	~~0.0018 gr/dscf; 0.009 lb/hr; 0.040 ton/yr~~
Emission Group 04 – Fettling Shop					
EU63	Fettling Baghouse Waste Dust Silo	Bin Vent Filter (CU12)	0.0030 gr/dscf; 0.015 lb/hr; 0.06~~8~~7 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.06~~8~~7 ton/yr	0.00~~30~~18 gr/dscf; 0.01~~5~~09 lb/hr; 0.06~~8~~40 ton/yr

Commented [CS28]: EU58 is not installed

e. The permittee shall not emit to the atmosphere total VOC emissions greater than the

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

following: [401 KAR 51:017]

Emission Unit	Description	BACT Control Device	BACT for VOC
Emission Group 01 – Melt Shop			
~~EU03~~	~~Scrap Drying~~	~~None~~	~~0.038 lb/hr; 0.17 ton/yr~~

Commented [CS29]: EU03 is not installed

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Unit	Description	BACT Control Device	BACT for VOC
Emission Group 03 – Casting & Molding			
EU53	Shakeout Conveyor	None	0.52810 lb/ton gray iron; 24.158 ton/yr

f. The permittee shall not emit to the atmosphere total CO emissions greater than the following: [401 KAR 51:017]

Emission Unit	Description	BACT Control Device	BACT for CO
Emission Group 01 – Melt Shop			
~~EU03~~	~~Scrap Drying~~	~~None~~	~~0.58 lb/hr; 2.52 ton/yr~~
Emission Group 03 – Casting & Molding			
EU53	Shakeout Conveyor	None	1.00 lb/ton gray iron; 25.3 lb/hr

Commented [CS30]: EU03 is not installed

Compliance Demonstration Method:
Refer to **3. Testing Requirements, 4. Specific Monitoring Requirements, 5. Specific Recordkeeping Requirements, 6. Specific Reporting Requirements,** and **7. Specific Control Equipment Operating Conditions.**

g. Refer to **SECTION D** for group PSD limits for PM, PM_{10}, $PM_{2.5}$, VOC, and CO, and source-wide HAP emission limitations.

3. Testing Requirements:

a. ~~The permittee shall conduct a performance test to demonstrate initial compliance with the applicable emissions limits for each building or structure housing foundry operations that is subject to the opacity limit for fugitive emissions in 40 CFR 63.10895(e). The permittee shall conduct the test within 180 days of startup and report the results in the notification of compliance status. [40 CFR 63.10898(a)]~~

Commented [CS31]: Initial compliance demonstration has been completed.

b. The permittee shall conduct each opacity test for fugitive emissions according to the requirements in 40 CFR 63.6(h)(5) and Table 1 to 40 CFR 63, Subpart ZZZZZ. [40 CFR 63.10898(h)]

c. The permittee shall conduct subsequent performance tests to demonstrate compliance with the opacity limit in 40 CFR 63.10895(e) no less frequently than every 6 months and each time the permittee makes a process change likely to increase fugitive emissions. [40 CFR 63.10898(i)]

d. ~~In the performance test report, the permittee shall certify that the capture system operated normally during the performance test. [40 CFR 63.10898(j)]~~

Commented [CS32]: Performance test is not required for these emission units.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

~~c.~~d. For fugitive emissions from buildings or structures housing any iron and steel foundry emissions sources subject to opacity limit in 40 CFR 63.10895(e), the permittee shall: [40 CFR 63, Subpart ZZZZZ, Table 1(2)]

i. Using a certified observer, conduct each opacity test according to EPA Method 9 (40 CFR part 60, appendix A-4) and 40 CFR 63.6(h)(5). [40 CFR 63, Subpart ZZZZZ, Table 1(2)(a)]

1) The certified observer may identify a limited number of openings or vents that appear to have the highest opacities and perform opacity observations on the identified openings or vents in lieu of performing observations for each opening or vent from the building or structure. Alternatively, a single opacity observation for the entire building or structure may be performed, if the fugitive release points afford such an observation. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(a)(i)]

2) During testing intervals when PM performance tests, if applicable, are being conducted, conduct the opacity test such that the opacity observations are recorded during the PM performance tests. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(a)(ii)]

ii. As alternative to Method 9 performance test, conduct visible emissions test by Method 22 (40 CFR part 60, appendix A-7). The test is successful if no visible emissions are observed for 90 percent of the readings over 1 hour. If VE is observed greater than 10 percent of the time over 1 hour, then the facility must conduct another performance test as soon as possible, but no later than 15 calendar days after the Method 22 test, using Method 9 (40 CFR part 60, appendix A-4). [40 CFR 63, Subpart ZZZZZ, Table 1(2)(b)]

1) The observer may identify a limited number of openings or vents that appear to have the highest visible emissions and perform observations on the identified openings or vents in lieu of performing observations for each opening or vent from the building or structure. Alternatively, a single observation for the entire building or structure may be performed, if the fugitive release points afford such an observation. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(b)(i)]

2) During testing intervals when PM performance tests, if applicable, are being conducted, conduct the visible emissions test such that the observations are recorded during the PM performance tests. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(b)(ii)]

~~f.~~e. Except as provided in 401 KAR 50:045, performance tests used to demonstrate compliance with 401 KAR 59:010, Section 3 shall be conducted according to the following methods. Kentucky Methods 50 and 150(F-1) and other methods are filed by reference in 401 KAR 50:015. [401 KAR 59:010, Section 4]

i. Reference Method 5 for the emission rates of particulate matter and the associated moisture content. [401 KAR 59:010, Section 4(1)]

ii. Reference Method 1 for sample and velocity traverses. [401 KAR 59:010, Section 4(2)]

iii. Reference Method 2 for velocity and volumetric flow rate. [401 KAR 59:010, Section 4(3)]

iv. Reference Method 3 for gas analysis. [401 KAR 59:010, Section 4(4)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

v. Reference Method 9 for opacity of continuous emissions. [401 KAR 59:010, Section 4(5)]
vi. For Reference Method 5, Reference Method 1 shall be used to select the sampling site and the number of traverse sampling points. The sampling time for each run shall be at least sixty (60) minutes and the minimum sample volume shall be 0.85 dscm (thirty (30) dscf) except that smaller sampling time or volumes, when necessitated by process variables or other factors, may be approved by the Cabinet. [401 KAR 59:010, Section 4(7)]

~~g.~~f. Pursuant to 401 KAR 59:005, Section 2(2) and 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.

~~h.~~g. For emission unit EU53, the permittee shall perform individual initial performance testing according to 401 KAR 50:055 and every 5 years thereafter. This testing shall be used to demonstrate compliance with the individual BACT limitations in **2. Emission Limitations.** The testing shall also develop emission factors in pounds of pollutant per ton of gray iron for CO and VOC according to following test methods: [401 KAR 51:017]
~~i.~~h. 40 CFR 60, Appendix A, Method 10 for CO;
ii. 40 CFR 60, Appendix A, Method 25 for VOC;
iii. Or an alternate test method as approved by the Division.

i. The permittee shall, within 180 days of permit issuance~~after startup of the emissions units listed above~~, verify the direction of airflow through both the largest building wall opening closest to each process and the largest opening of each hood and exhaust pickup point, is inward using a smoke tube and the following procedures: [401 KAR 51:017]
i. The direction of airflow shall be monitored for at least 1 hour, with checks made no more than 10 minutes apart.
ii. The ~~fan RPM and~~ volumetric flow rate shall be monitored during the test.

~~j.~~i. Refer to **SECTION D** for group testing requirements.

4. Specific Monitoring Requirements:

~~a. The permittee shall make monthly inspections of the equipment that is important to the performance of the total capture system (i.e., pressure sensors, dampers, and damper switches). This inspection shall include observations of the physical appearance of the equipment (e.g., presence of holes in the ductwork or hoods, flow constrictions caused by dents or accumulated dust in the ductwork, and fan erosion). The permittee shall repair any defect or deficiency in the capture system as soon as practicable, but no later than 90 days. The permittee shall record the date and results of each inspection and the date of repair of any defect or deficiency. [40 CFR 63.10897(e)]~~

Commented [CS33]: This paragraph is only applicable to metal melting operations.

~~b. The permittee shall install, operate, and maintain each CPMS or other measurement device according to the O&M plan. The permittee shall record all information needed to document conformance with these requirements. [40 CFR 63.10897(f)]~~

Commented [CS34]: This paragraph is only applicable to metal melting operations

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

~~e.~~a. ~~In the event of an exceedance of an established emissions limitation (including an operating limit), the permittee shall restore operation of the emissions source (including the control device and associated capture system) to its normal or usual manner or operation as expeditiously as practicable in accordance with good air pollution control practices for minimizing emissions. The response shall include minimizing the period of any startup, shutdown or malfunction and taking any necessary corrective actions to restore normal operation and prevent the likely recurrence of the exceedance. The permittee shall record the date and time correction action was initiated, the correction action taken, and the date corrective action was completed. [40 CFR 63.10897(g)]~~

Commented [CS35]: This is only applicable to metal melting furnaces.

~~d. The permittee shall perform a qualitative visual observation of the opacity of emissions at each stack daily and maintain a log of the observations. If visible emissions from a stack are seen (not including condensed water in the plume), then an inspection of process/control equipment shall be initiated and corrective action taken. If visible emissions are present after the corrective action, the process(s) shall be shut down and shall not operate again until repairs have been made that result in no visible emissions from the process(s) during operation. In lieu of shutting the process(s) down, the permittee may determine the opacity using Reference Method 9. If the opacity limit is not exceeded, the process(s) may continue to operate. [401 KAR 51:017]~~

Commented [CS36]: There are no fugitive egress point stacks and the baghouse has a BLDS installed, therefore a daily qualitative visual observation should not be required

~~e.~~b. For each emission unit listed above, the permittee shall monitor the following parameters:

i. Monthly and 12-month rolling total hours of operation;
ii. Monthly and 12-month rolling total throughput;
iii. The monthly ~~3-hour average~~ emission rate in ton/yr~~lb/hr~~ of PM, PM_{10}, $PM_{2.5}$, CO, and VOC for each process with an emission limitation in **2. Emission Limitations(d), (e),** or **(f),** calculated monthly.
iv. The 12-month rolling total emission rate in ton/yr of PM, PM_{10}, $PM_{2.5}$, CO, and VOC for each process with an emission limitation in **2. Emission Limitations(d), (e),** or **(f),** calculated monthly.

~~f.~~c. For each emission unit listed above ~~except EU60, EU61, EU62, EU64, EU65, EU66, and EU67,~~ the permittee shall perform individual inspections during each day~~shift~~ and certify that no visible fugitive emissions are detected from each applicable building opening. [401 KAR 51:017]

Commented [CS37]: Stack emissions are addressed via the BLDS. This has been modified to include documentation of any fugitive emissions from the applicable building.

~~g.~~d. Refer to **SECTION E.**

5. Specific Recordkeeping Requirements:

a. As required by 40 CFR 63.10(b)(1) and as applicable, the permittee shall maintain files of all information (including all reports and notifications) for at least 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record. At a minimum, the most recent 2 years of data shall be retained on site. The remaining 3 years of data may be retained off site. Such files may be maintained on microfilm, on a computer, on computer floppy disks, on magnetic tape disks, or on microfiche. [40 CFR 63.10899(a)]

Commented [CS38]: This has been added due to the only required record for the above operations is the semiannual determination of building opacity.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

b. In addition to the records required by 40 CFR 63.10, the permittee shall keep records of the information specified in 40 CFR 63.10899(b)(1) through (13). [40 CFR 63.10899(b)]

i. The permittee shall keep records of the written materials specifications according to 40 CFR 63.10885(a) and records that demonstrate compliance with the requirements for restricted metallic scrap in 40 CFR 63.10885(a)(1) and/or for the use of general scrap in 40 CFR 63.10885(a)(2) and for mercury in 40 CFR 63.10885(b)(1) through (3), as applicable. The permittee shall keep records documenting compliance with 40 CFR 63.10885(b)(4) for scrap that does not contain motor vehicle scrap. [40 CFR 63.10899(b)(1)]

ii. If the permittee is subject to the requirements for a site-specific plan for mercury under 40 CFR 63.10885(b)(1), the permittee shall: [40 CFR 63.10899(b)(2)]

1) Maintain records of the number of mercury switches removed or the weight of mercury recovered from the switches and properly managed, the estimated number of vehicles processed, and an estimate of the percent of mercury switches recovered; and [40 CFR 63.10899(b)(2)(i)]

2) Submit semiannual reports of the number of mercury switches removed or the weight of mercury recovered from the switches and properly managed, the estimated number of vehicles processed, an estimate of the percent of mercury switches recovered, and a certification that the recovered mercury switches were recycled at RCRA permitted facilities. The semiannual reports shall include a certification that the permittee has conducted periodic inspections or taken other means of corroboration as required under 40 CFR 63.10885(b)(1)(ii)(C). The permittee shall identify which option in 40 CFR 63.10885(b) applies to each scrap provider, contract, or shipment. The permittee may include this information in the semiannual compliance reports required under 40 CFR 63.10899(c). [40 CFR 63.10899(b)(2)(ii)]

iii. If the permittee is subject to the option for approved mercury programs under 40 CFR 63.10885(b)(2), the permittee shall maintain records identifying each scrap provider and documenting the scrap provider's participation in an approved mercury switch removal program. If the scrap provider is a broker, the permittee shall maintain records identifying each of the broker's scrap suppliers and documenting the scrap supplier's participation in an approved mercury switch removal program. [40 CFR 63.10899(b)(3)]

iv. The permittee shall keep records of monthly metal melt production for each calendar year. [40 CFR 63.10899(b)(6)]

v. The permittee shall keep a copy of the operation and maintenance plan as required by 40 CFR 63.10896(a) and records that demonstrate compliance with plan requirements. [40 CFR 63.10899(b)(7)]

vi. The permittee shall keep records for bag leak detection systems as follows: [40 CFR 63.10899(b)(9)]

1) Records of the bag leak detection system output; [40 CFR 63.10899(b)(9)(i)]

2) Records of bag leak detection system adjustments, including the date and time of the adjustment, the initial bag leak detection system settings, and the final bag leak detection system settings; and [40 CFR 63.10899(b)(9)(ii)]

Commented [CS39]: This section is applicable to the furnaces.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

~~3) The date and time of all bag leak detection system alarms, and for each valid alarm, the time corrective action was initiated, the corrective action taken, and the date on which corrective action was completed. [40 CFR 63.10899(b)(9)(iii)]~~

~~vii. The permittee shall keep records of capture system inspections and repairs as required by 40 CFR 63.10897(e). [40 CFR 63.10899(b)(10)]~~

~~viii. The permittee shall keep records demonstrating conformance with the specifications for the operation of CPMS as required by 40 CFR 63.10897(f). [40 CFR 63.10899(b)(11)]~~

~~ix. The permittee shall keep records of corrective action(s) for exceedances and excursions as required by 40 CFR 63.10897(g). [40 CFR 63.10899(b)(12)]~~

~~x. The permittee shall record the results of each inspection and maintenance required by 40 CFR 63.10897(a) for PM control devices in a logbook (written or electronic format). The permittee shall keep the logbook onsite and make the logbook available to the Division upon request. The permittee shall keep records of the information specified in 40 CFR 63.10899(b)(13)(i) through (iii). [40 CFR 63.10899(b)(13)]~~

~~1) The date and time of each recorded action for a fabric filter, the results of each inspection, and the results of any maintenance performed on the bag filters. [40 CFR 63.10899(b)(13)(i)]~~

~~c.~~b. The permittee shall record the occurrence, duration, cause and any corrective action taken for any incident or malfunction that occurs that causes or might cause an exceedance of the particulate emission or opacity standard when an emission unit is in operation. A log of any required Method 9 observations and any required qualitative visual observations shall be kept and made available for inspection.

~~d.~~c. For each emission unit listed above, the permittee shall maintain records of the following:

i. Monthly and 12-month rolling total hours of operation;
ii. Monthly and 12-month rolling total throughput;
iii. The monthly ~~3-hour average~~ emission rate of PM, PM_{10}, $PM_{2.5}$, CO, and VOC for each process with an emission limitation in **2. Emission Limitations(d), (e),** or **(f)** calculated monthly.
iv. The 12-month rolling total emission rate of PM, PM_{10}, $PM_{2.5}$, CO, and VOC for each process with an emission limitation in **2. Emission Limitations(d), (e),** or **(f)** calculated monthly.
v. SDSs for all materials used.

~~e.~~d. The permittee shall maintain a copy of the GCOP plan required by **1. Operating Limitations (g)** as well as any revisions. [401 KAR 51:017]

~~f.~~e. The permittee shall maintain records of any time that ~~EU03, EU04,~~ EU05, EU06, ~~EU11, EU12~~, EU15, EU16, EU18, EU44, EU45, EU46, and EU47~~, or EU52~~ was not operated according to the GCOP plan required by **1. Operating Limitations (g)** with a description of the situation and actions taken to remedy the issue. [401 KAR 51:017]

Commented [CS40]: EU03, EU04, EU11, and EU12 were not installed. EU52 is not a source of combustion emissions.

~~g.~~f. The permittee shall maintain records of the calculations required in **SECTION D**.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

6. Specific Reporting Requirements:

a. The permittee shall submit semiannual compliance reports to the Division according to the requirements in 40 CFR 63.10(e). The reports shall include, at a minimum, the following information as applicable: [40 CFR 63.10899(c)]

i. Summary information on the number, duration, and cause (including unknown cause, if applicable) of excursions or exceedances, as applicable, and the corrective action taken; [40 CFR 63.10899(c)(1)]

ii. Summary information on the number, duration, and cause (including unknown cause, if applicable) for monitor downtime incidents (other than downtime associated with zero and span or other calibration checks, if applicable); and [40 CFR 63.10899(c)(2)]

iii. Summary information on any deviation from the pollution prevention management practices in 40 CFR 63.10885 and 63.10886 and the operation and maintenance requirements 40 CFR 63.10896 and the corrective action taken. [40 CFR 63.10899(c)(3)]

~~b. The notification of compliance status required by 40 CFR 63.9(h) shall include this certification of compliance, signed by a responsible official: [40 CFR 63, Subpart ZZZZZ, Table 4]~~

~~i. "This facility has prepared, and will operate by, written material specifications for metallic scrap according to 40 CFR 63.10885(a)(1)" and/or "This facility has prepared, and will operate by, written material specifications for general iron and steel scrap according to 40 CFR 63.10885(a)(2)."~~

~~ii. "This facility has prepared, and will operate by, written material specifications for the removal of mercury switches and a site-specific plan implementing the material specifications according to 40 CFR 63.10885(b)(1)" and/or "This facility participates in and purchases motor vehicles scrap only from scrap providers who participate in a program for removal of mercury switches that has been approved by the EPA Administrator according to 40 CFR 63.10885(b)(2) and have prepared a plan for participation in the EPA approved program according to 40 CFR 63.10885(b)(2)(iv)" and/or "The only materials from motor vehicles in the scrap charged to a metal melting furnace at this facility are materials recovered for their specialty alloy content in accordance with 40 CFR 63.10885(b)(3) which are not reasonably expected to contain mercury switches" and/or "This facility complies with the requirements for scrap that does not contain motor vehicle scrap in accordance with 40 CFR 63.10885(b)(4)."~~

~~iii. "This facility has prepared and will operate by an operation and maintenance plan according to 40 CFR 63.10896(a)."~~

~~iv. "This facility has prepared and will operate by a site-specific monitoring plan for each bag leak detection system and submitted the plan to the Division for approval according to 40 CFR 63.10897(d)(2)."~~

~~c. The permittee shall, within 90 days after conducting the initial performance test, submit the design information and analysis, with supporting documentation, demonstrating that each capture and collection system (hood, canopy, open entrance, etc.) meets accepted engineering standards, such as those published by the American Conference of~~

Commented [CS41]: This should be either a facility requirement or under the metal melting furnaces. Also this language needs to change based on the latest revision of Subpart ZZZZZ.

Commented [CS42]: The NOCS has already been submitted.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

~~Governmental Industrial Hygienists, and is capable of meeting the capture efficiency requirement in **1. Operating Limitations**~~ **(h).** [401 KAR 51:017]

7. Specific Control Equipment Operating Conditions:

a. For EU17, EU19, EU20, EU21, EU35A, EU35B, EU57, ~~EU58~~ and EU63, the permittee shall install, calibrate (if applicable), maintain and operate, according to manufacturer's specifications, bin vent filters designed to achieve the BACT limits in **2. Emission Limitations(d)**. The permittee shall make the bin vent filter manufacturer's specifications~~se records~~ available for inspection by the Division. [401 KAR 51:017]

Commented [CS43]: EU58 was not installed.

b. For all emission units, other than those identified in **7.a. Specific Control Equipment Operating Conditions(a)**, the permittee shall install, calibrate (if applicable), maintain and operate, according to manufacturer's specifications, fabric filters designed to achieve the BACT limits in **SECTION D(5)**. The permittee shall make the fabric filter manufacturer's specifications~~se records~~ available for inspection by the Division. [401 KAR 51:017]

c. Refer to **SECTION E** for control device requirements pursuant to 40 CFR 63, Subpart ZZZZZ and 401 KAR 51:017.

d. The permittee shall operate the control devices associated with each emission unit at all times that the emission unit is operating. [401 KAR 51:017]

e. The permittee shall install, operate, and maintain a Sulfuric Acid Scrubber for control of amine gas emitted from the PUCB Core Machines (EU39-EU42)~~core machines~~. [401 KAR 51:017]

f. For each baghouse, the permittee shall continuously monitor the inlet volumetric flow rate in the stack, and maintain it at 80% or above the level measured during the testing required by **3. Testing Requirements (i)**.

g. The permittee shall install, calibrate (if applicable), maintain and operate, according to manufacturer's specifications, a monitoring device (differential pressure gauges or manometers) to determine the pressure drop across each baghouse, at a minimum, once a day~~shift~~ during the operation of the unit. A permanent label displaying the operating range established for each baghouse shall be posted next to the selected instrument. [401 KAR 51:017]

8. Alternate Operating Scenarios:

Refer to **Section H**.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Coating Operations

Emission Group 06 – Coating

Emission Unit 68 (EU68) **Paint Line #3**
Booth #1 Description:
Model: Sturm Maschinenbau ZS16
Estimated Start of Construction: September 2018~~August 2016~~
Maximum Capacity: 7.22~~28.9~~ lb post-induction coating (coating and thinner)/hr Controls: Paint Booth Filter (CU14)

Emission Unit 69 (EU69) **Paint Line ~~Booth~~ #2**
Description:
Model: Sturm Maschinenbau ZS16
Estimated Start of Construction: November 2017~~August 2016~~
Maximum Capacity: 7.22~~28.9~~ lb post-induction coating (coating and thinner)/hr Controls: Paint Booth Filter (CU15)

~~**Emission Unit 70 (EU70) Paint Booth #3**~~
~~**Description:**~~
~~Model: Sturm Maschinenbau ZS16~~
~~Estimated Start of Construction: March 2019~~
~~Maximum Capacity: 28.9 lb post-induction coating/hr~~
~~Controls: Paint Booth Filter (CU16)~~

Emission Unit 71 (EU71) **Paint Line #1~~Booth #4~~**
Description:
Model: Sturm Maschinenbau ZS16
Estimated Start of Construction: March 2017~~August 2016~~
Maximum Capacity: 3.54~~2.38~~ lb pre-induction coating/hr Controls: Paint Booth Filter (CU17)

Description: Three~~Four~~ (34) paint booths that apply coatings to finished parts. EU 68-69~~70~~ apply a zinc paint to each part, EU71 applies a zinc solution. Each of these paint booths are equipped with electrostatic spray nozzles that achieve at least 70% transfer efficiency.

APPLICABLE REGULATIONS:
401 KAR 51:017, Prevention of significant deterioration of air quality.
401 KAR 59:010, New process operations.
401 KAR 59:225, New miscellaneous metal parts and products surface coating operations.

STATE-ORIGIN REQUIREMENTS:
401 KAR 63:020, Potentially hazardous matter or toxic substances, applicable with respect to each affected facility which emits or may emit Xylene, Methanol, or Zinc.

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Commented [CS44]: EU70 has not been installed.
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SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

PRECLUDED REGULATIONS:

40 CFR 63, Subpart HHHHHH, National Emission Standards for Hazardous Air Pollutants: Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources.

1. **Operating Limitations:**
   a. The permittee shall only use coatings with a VOC content of less than three and five- tenths (3.5) lb/gal of coating (0.42 kg/l), excluding water or exempt solvent or both, delivered to applicators associated with air or forced air-dried items or items subject to outdoor or harsh exposure or extreme environmental conditions. [401 KAR 59:225, Section 6(1)(b); 401 KAR 51:017]

   b. The permittee shall only use post-induction coatings with a solids content of less than 0.87 lb/lb of coating delivered to the applicators. [401 KAR 51:017]

   c. The permittee shall only use pre-induction coatings with a solids content of less than 0.35 lb/lb of coating delivered to the applicators. [401 KAR 51:017]

   d. The amount of exempt solvent shall be subtracted from the amount of coatings, just like water, with the ultimate value of interest being the mass of VOC per unit volume of coating less exempt solvent or water or both. [401 KAR 59:225, Section 4(6)]

   e. The permittee shall not use any spray-applied coating that contains any individual compounds of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd) that are an Occupational Safety and Health Administration (OSHA)-defined carcinogen as specified in 29 CFR 1910.1200(d)(4) at a concentration greater than 0.1 percent by mass, or greater than 1.0 percent by mass for any other individual compound of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd). For the purpose of determining whether materials used contain compounds of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd), the permittee may rely on formulation data provided by the manufacturer or supplier, such as the material safety data sheet (MSDS), as long as it represents each compound of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd) in the material that is present at 0.1 percent by mass or more for compounds of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd) that are OSHA-defined carcinogens as specified in 29 CFR 1910.1200(d)(4) and at 1.0 percent by mass or more for other compounds of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd). [To preclude 40 CFR 63, Subpart HHHHHH]

   f. The permittee shall limit the throughput through EU68, EU69~~, and EU70~~ to a combined 63.25~~138.9~~ tons/yr of post-induction coating (coating and thinner) on a rolling 12-month basis. [401 KAR 51:017]

   g. The permittee shall limit the throughput through EU71 to 15.5 tons/yr of pre-induction coating on a rolling 12-month basis. [401 KAR 51:017]

Commented [CS45]: Coating is not air dried.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

h. The permittee shall limit thinner usage to a combined 12.886.9 tons/yr of thinner on a rolling 12-month basis. [401 KAR 51:017]

i. The permittee shall~~, within 90 days of startup, develop and~~ maintain and implement a work practice plan to minimize VOC emissions from the storage, mixing, and conveying of coatings, thinners, and cleaning materials used in, and waste materials generated by, all coating operations. The plan shall specify practices and procedures to ensure that, at a minimum, the following elements are implemented: [401 KAR 51:017]
   i. All VOC-containing coatings, thinners, cleaning materials, and waste materials shall be stored in closed containers.
   ii. The risk of spills of VOC-containing coatings, thinners, cleaning materials, and waste materials shall be minimized.
   iii. VOC-containing coatings, thinners, cleaning materials, and waste materials shall be conveyed from one location to another in closed containers or pipes.
   iv. Mixing vessels which contain VOC-containing coatings and other materials shall be closed except when adding to, removing, or mixing the contents.
   v. Emissions of VOC shall be minimized during cleaning of storage, mixing, and conveying equipment.

j. The permittee shall ensure that each paint booth capture system achieves 100% efficiency. The permittee shall demonstrate this by meeting the following requirements: [401 KAR 51:017]
   i. Performing testing according to **3. Testing Requirements (f).**
   ii. Ensuring all coatings and thinners used in the coating operation are applied within the capture system, and coating solvent flash-off and coating curing and drying occurs within the capture system. For example, this criterion is not met if parts enter the open shop environment when being moved between a spray booth and a curing oven.
   iii. The direction of the air flow at all times shall be into the enclosure; and either
      1) The average facial velocity of air through all natural draft openings in the enclosure shall be at least 200 feet per minute; or
      2) The pressure drop across the enclosure shall be at least 0.007 inch water, as established in Method 204 of appendix M to 40 CFR part 51.

k. The permittee shall maintain the facial velocity of air flow through all natural draft openings or the pressure drop at or above the facial velocity limit or pressure drop limit, and maintain the direction of air flow into the enclosure at all times. [401 KAR 51:017]

Compliance Demonstration Method:
Refer to **3. Testing Requirements, 4. Specific Monitoring Requirements, 5. Specific Recordkeeping Requirements, 6. Specific Reporting Requirements**, and **7. Specific Control Equipment Operating Conditions.**

2. Emission Limitations:

a. The permittee shall not cause, suffer, allow, or permit any visible emission of particulate matter into the open air from a control device or stack associated with any affected facility which is equal to or greater than twenty (20) percent opacity for more than three

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

(3) minutes, as measured by U.S. EPA Reference Method 9. [401 KAR 59:010, Section 3(1)(a); 401 KAR 51:017]

Compliance Demonstration Method:
Refer to **4. Monitoring Requirements(c)** for opacity compliance demonstration.

b. For emissions from a control device or stack no person shall cause, suffer, allow or permit the emission into the open air of particulate matter from any affected facility which is in excess of the following: [401 KAR 59:010, Section 3(2)]
   i. For process weight rates of 0.50 ton/hr or less: 2.34 lb/hr
   ii. For process weight rates up to 30 tons/hr: $E'_{PM_j} = 3.59P_j^{0.62}$
   iii. For process weight rates greater than 30 tons/hr: $E'_{PM_j} = 17.31P_j^{0.16}$

   Where:
   j = Emission Unit;
   E'_{PM_j} = The allowable particulate emission rate for unit j in pounds/hour;
   P_j = The average process weight rate in tons/hour

Compliance Demonstration Method:
Compliance with the hourly particulate emission limitations in 401 KAR 59:010, Section 3(2) is assumed when compliance with the limitations in **2. Emission Limitations(c)** is demonstrated.

c. For EU68 and, EU69~~, and EU70,~~ the permittee shall not cause or contribute to combined total emissions of PM, PM_{10}, and $PM_{2.5}$ that, on a rolling 12-month basis, equal or exceed 0.202~~363~~ tons of PM, PM_{10}, or $PM_{2.5}$ per year. [401 KAR 51:017]

d. For EU71, the permittee shall not cause or contribute to total emissions of PM, PM_{10}, and $PM_{2.5}$ that, on a rolling 12-month basis, equal or exceed 1.133~~0.016~~ tons of PM, PM_{10}, or $PM_{2.5}$ per year. [401 KAR 51:017]

e. For EU68 and, EU69~~, and EU70~~, the permittee shall not cause or contribute to combined total emissions of VOC (including contributions from thinner usage) that, on a rolling 12-month basis, equal or exceed 19.425~~25.7~~ tons of VOC per year. [401 KAR 51:017]

f. EU71, the permittee shall not cause or contribute to total emissions of VOC that, on a rolling 12-month basis, equal or exceed 3.244~~1.94~~ tons of VOC per year. [401 KAR 51:017]

Compliance Demonstration Method:
Refer to **3. Testing Requirements**, **4. Specific Monitoring Requirements**, **5. Specific Recordkeeping Requirements**, and **7. Specific Control Equipment Operating Conditions.**

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

g. The source is in compliance with 401 KAR 63:020 based on the emission rates of toxics and hazardous air pollutants given in the application and supplemental information submitted by the source.
h. Refer to **SECTION D** for source-wide HAP emission limitations.

3. Testing Requirements:

a. If deemed necessary by the Cabinet, the Cabinet shall obtain samples of the coatings used at an affected facility to verify that the coatings meet the requirements in 401 KAR 59:225, Section 6. Appendix A to 40 CFR 60, Method 24, which has been incorporated by reference in 401 KAR 50:015, shall be used as applicable to determine compliance of the coatings unless the Cabinet determines that other methods would be more appropriate. [401 KAR 59:225, Section 4(4)]

b. Except as provided in 401 KAR 50:045, performance tests used to demonstrate compliance with 401 KAR 59:010, Section 3 shall be conducted according to the following methods. Kentucky Methods 50 and 150(F-1) and other methods are filed by reference in 401 KAR 50:015. [401 KAR 59:010, Section 4]
   i. Reference Method 5 for the emission rates of particulate matter and the associated moisture content. [401 KAR 59:010, Section 4(1)]
   ii. Reference Method 1 for sample and velocity traverses. [401 KAR 59:010, Section 4(2)]
   iii. Reference Method 2 for velocity and volumetric flow rate. [401 KAR 59:010, Section 4(3)]
   iv. Reference Method 3 for gas analysis. [401 KAR 59:010, Section 4(4)]
   v. Reference Method 9 for opacity of continuous emissions. [401 KAR 59:010, Section 4(5)]
   vi. For Reference Method 5, Reference Method 1 shall be used to select the sampling site and the number of traverse sampling points. The sampling time for each run shall be at least sixty (60) minutes and the minimum sample volume shall be 0.85 dscm (thirty (30) dscf) except that smaller sampling time or volumes, when necessitated by process variables or other factors, may be approved by the Cabinet. [401 KAR 59:010, Section 4(7)]

c. For emission units EU68, EU69~~, EU70,~~ and EU71, the permittee shall perform individual initial performance testing according to 401 KAR 50:055 and every 5 years thereafter. This testing shall be used to demonstrate compliance with the individual BACT limitations in **2. Emission Limitations** and **1. Operating Limitations(a)**. This testing shall also develop inlet and outlet emission factors in pounds of pollutant per pound of coating for PM, PM_{10}, $PM_{2.5}$, and VOC according to following test methods: [401 KAR 51:017]
   i. 40 CFR 60, Appendix A, Method 5 for PM;
   ii. 40 CFR 51, Appendix M, Method 201A for PM_{10} and $PM_{2.5}$;
   iii. 40 CFR 60, Appendix A, Method 24 for VOC;
   iv. Or an alternate test method as approved by the Division.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

d. The permittee shall determine the mass fraction of organic HAP for each material used, on a monthly basis or when the formulation of the coating changes, by using one of the options below:
   i. The permittee may use 40 CFR 63, Appendix A, Method 311 for determining the mass fraction of organic HAP.
   ii. For coatings, the permittee may use Method 24 to determine the mass fraction of nonaqueous volatile matter and use that value as a substitute for mass fraction of organic HAP.
   iii. The permittee may rely on information other than that generated by the test methods specified above, such as manufacturer's formulation data, if it represents each organic HAP that is present at 0.1 percent by mass or more for OSHA-defined carcinogens, as specified in 29 CFR 1910.1200(d)(4), and at 1.0 percent by mass or more for other compounds. If there is a disagreement between such information and results of a test conducted according to the terms above, then the test method results will take precedence, unless after consultation, the facility demonstrates to the satisfaction of the Division that the facility's data are correct. If a range of values is given for the mass fraction, the permittee shall use the maximum of the range in the calculation of emissions.

e. The permittee shall determine the density of each material used during the month from test results using ASTM Method D1475-98 (Reapproved 2003), "Standard Test Method for Density of Liquid Coatings, Inks, and Related Products" or information from the supplier or manufacturer of the material. If there is disagreement between ASTM Method D1475-98 (Reapproved 2003) test results and the supplier's or manufacturer's information, the test results will take precedence unless after consultation, the facility demonstrates to the satisfaction of the Division that the facility's data are correct.

f. The permittee shall demonstrate that the capture system meets the criteria in Method 204 of appendix M to 40 CFR part 51 for a PTE.

~~g. The permittee shall perform a mass balance test to determine the mass transfer percentage of solids for each paint booth.~~

~~h.~~g. Pursuant to 401 KAR 59:005, Section 2(2) and 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.

4. Specific Monitoring Requirements:

a. The permittee shall determine the volume in gallons of each material used during each month by measurement or usage records.

b. The permittee shall monitor and record the direction of air flow, and either:
   i. The facial velocity of air through all natural draft openings according to the following requirements for each flow measurement device, or:

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

1) The permittee shall locate a flow sensor in a position that provides a representative flow measurement in the duct from each capture device in the emission capture system to the add-on control device.
2) The permittee shall reduce swirling flow or abnormal velocity distributions due to upstream and downstream disturbances.
3) The permittee shall conduct a flow sensor calibration check at least semiannually.
4) The permittee shall, at least monthly, inspect components for integrity, electrical connections for continuity, and mechanical connections for leakage.

ii. The pressure drop across the enclosure according to the following requirements for each flow measurement device:
1) The permittee shall locate the pressure tap(s) in a position that provides a representative measurement of the pressure drop across each opening that is being monitored.
2) The permittee shall minimize or eliminate pulsating pressure, vibration, and internal and external corrosion.
3) The permittee shall check pressure tap pluggage monthly~~daily~~.
4) The permittee shall~~, using an inclined manometer with a measurement sensitivity of 0.0002 inch water,~~ check gauge calibration ~~quarterly~~ and transducer calibration quarterly~~monthly~~.
5) The permittee shall conduct calibration checks any time the sensor exceeds the manufacturer's specified maximum operating pressure range or install a new pressure sensor.
6) The permittee shall, at least monthly, inspect components for integrity, electrical connections for continuity, and mechanical connections for leakage.

c. The permittee shall perform a qualitative visual observation of the opacity of emissions at each stack daily and maintain a log of the observations. If visible emissions from a stack are seen (not including condensed water in the plume), then an inspection of process/control equipment shall be initiated and corrective action taken. If visible emissions are present after the corrective action, the process shall be shut down and shall not operate again until repairs have been made that result in no visible emissions from the process during operation. In lieu of shutting the process down, the permittee may determine the opacity using Reference Method 9. If the opacity limit is not exceeded, the process may continue to operate.

d. For each emission unit listed above, the permittee shall monitor the following parameters:
i. Monthly and 12-month rolling total hours of operation;
ii. Monthly and 12-month rolling total coating throughput;
iii. Monthly and 12-month rolling thinner usage;
~~iv.~~ Monthly and 12-month rolling total emissions of PM, PM_{10}, ~~and~~ $PM_{2.5}$, VOC and HAP in tons/yr, ~~calculated monthly according to the following equation:~~

~~$E_{xi} = [(\frac{P_{ij} * 30\% * EF_{jx}}{2000}) * (1 - B_{jx})]$~~

Commented [CS46]: Method of emission calculations should be as provided in the permit application.

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SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

$$T_{jx} = \sum_{i=1}^{12} E_{xi}$$

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Where:

i = Month;

j = Emission Unit;

x = Pollutant (PM, PM_{10}, or $PM_{2.5}$)

E_x = The actual average monthly emission rate of pollutant x from unit j during month i in tons of x per month;

P_i = The actual specific throughput through unit j during month i in pounds of coating used per month;

EF_j = The corresponding solids content of the coating used in emission unit j or the emission factor determined by a representative performance test conducted according to the requirements of 401 KAR 50:045, within the last five (5) years, in pounds of pollutant x per pound of paint used;

B_{jx} = Control efficiency (%) of any control device at emission unit j for pollutant x;

T_{jx} = Total 12-month rolling emissions of pollutant x at emission unit j in tons of pollutant x per year;

30% = 1 - Transfer efficiency (70%) of the electrostatic spray nozzles.

v. 12-month rolling total emissions of VOC and HAP, in tons/yr, calculated monthly according to the following equation:

$$E_{xi} = \left(\frac{P_{ij} * EF_{jx}}{2000}\right)$$

$$T_{jx} = \sum_{i=1}^{12} E_{xi}$$

Where:

i = Month;

j = Emission Unit;

x = Pollutant (VOC or HAP)

E_{xi} = The actual average monthly emission rate of pollutant x from unit j during month i in tons of x per month;

P_{ij} = The actual specific throughput through unit j during month i in pounds of coating or thinner used per month;

EF_{jx} = The corresponding uncontrolled emission factor for pollutant x as approved by the most recent permitting action for emission unit j or the emission factor determined by a representative performance test conducted according to the requirements of 401 KAR 50:045, within the last five (5) years, in pounds of pollutant x per pound of paint used;

T_j = Total 12-month rolling emissions of pollutant x at emission unit j in tons of

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

~~pollutant x per year~~

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

5. Specific Recordkeeping Requirements:

a. Daily records shall be maintained by the source for the most recent two (2) year period. These records shall be made available to the Cabinet or the U.S. EPA upon request. The records shall include, but not be limited to, the following: [401 KAR 59:225, Section 4(8)]
   i. Applicable administrative regulation number; [401 KAR 59:225, Section 4(8)(a)]
   ii. Application method and substrate type; [401 KAR 59:225, Section 4(8)(b)]
   iii. Amount and type of adhesive, coating (including catalyst and reducer for multicomponent coatings), or solvent used at each point of application, including exempt compounds; [401 KAR 59:225, Section 4(8)(c)]
   iv. The VOC content as applied in each adhesive, coating, or solvent; [401 KAR 59:225, Section 4(8)(d)]
   v. The date for each application for adhesive, coating, or solvent; [401 KAR 59:225, Section 4(8)(e)]
   vi. The amount of surface preparation, cleanup, or washup solvent (including exempt compounds) used and the VOC content of each; and [401 KAR 59:225, Section 4(8)(f)]
   vii. Oven temperature, if applicable. [401 KAR 59:225, Section 4(8)(g)]

b. The permittee shall record the occurrence, duration, cause and any corrective action taken for any incident or malfunction that occurs that causes or might cause an exceedance of the particulate emission or opacity standard when an emission unit is in operation. A log of Method 9 observations and qualitative visual observations shall be kept and made available for inspection.

c. For each emission unit listed above, the permittee shall maintain records of the following:
   i. Monthly and 12-month rolling total hours of operation;
   ii. Monthly and 12-month rolling total throughput;
   iii. Monthly and 12-month rolling thinner usage;
   iv. Monthly and 12-month rolling total emissions of PM, PM_{10}, $PM_{2.5}$, VOC, and HAP in tons/yr, calculated monthly according to the equation in **4. Specific Monitoring Requirements(b).**
   v. MSDSs for all materials used.

d. The permittee shall maintain records of the following:
   i. A current copy of information provided by materials suppliers or manufacturers, such as manufacturer's formulation data, or test data used to determine the mass fraction of organic HAP, the density and the volume fraction of coating solids for each coating, the mass fraction of organic HAP and the density for each thinner, and the mass fraction of organic HAP for each cleaning material.
   ii. If the permittee conducted testing to determine mass fraction of organic HAP, density, or volume fraction of coating solids, the permittee shall keep a copy of the complete test report.
   iii. If the permittee uses information provided by the manufacturer or supplier of the material that was based on testing, the permittee shall keep the summary sheet of results provided by the manufacturer or supplier.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

iv. If the permittee uses the results of an analysis conducted by an outside testing lab, the permittee shall keep a copy of the test report. The permittee is not required to obtain the test report or other supporting documentation from the manufacturer or supplier.
v. A record of the name and volume of each cleaning material used during each month.
vi. A record of the mass fraction of HAP and VOC for each cleaning material used during each month.
vii. A record of the density for each cleaning material used during each month.
viii. The data and documentation used to support a determination that the capture system meets the criteria in Method 204 of appendix M to 40 CFR part 51 for a PTE and has a capture efficiency of 100 percent.
ix. Records of the data and calculations used to establish the emission capture and add- on control device operating limits and to document compliance with the operating limitations.
x. Records of the data and calculations used to determine the transfer efficiency for all coatings.
xi. A record of the work practice plans required and documentation that the plans are being implemented on a continuous basis. Appropriate documentation may include operational and maintenance records, records of documented inspections, and records of internal audits.
xii. For each add-on control device and for each continuous parameter monitoring system, a copy of the equipment operating instructions shall be maintained on-site for the life of the equipment in a location readily available to plant operators and inspectors. The permittee may prepare the equipment operating instructions, or they may be provided by the equipment supplier or other third party.

e. Copies of the current work practice plans developed in accordance with **1. Operating Requirements(g)**, as well as plans developed within the preceding 5 years shall be available on-site for inspection and copying by the Division.

f. The permittee shall keep monthly records of the following:
   i. For each coating used, a record of the volume used in each month, the mass fraction HAP content, the mass fraction VOC content, the density, and the volume fraction of solids.
   ii. For each thinner used, a record of the volume used in each month, the mass fraction HAP content, the mass fraction VOC content, and the density.
   iii. A record of the calculation of the HAP and VOC emission rate for all coatings and thinners. This record must include all raw data, algorithms, and intermediate calculations. If these data are maintained as electronic files, the electronic files, as well as any paper copies must be maintained.
   iv. A record, for each month, of the calculation of the average monthly mass HAP and VOC content.

6. Specific Reporting Requirements:
Refer to **SECTION F**.

7. Specific Control Equipment Operating Conditions:

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

a. For all emission units listed above, the permittee shall install, maintain, and operate, according to manufacturer's specifications, fabric filters designed to achieve the BACT limits in **1. Operating Limitations(b)** and **(c)**, and **2. Emission Limitations(c)**. The permittee shall make the manufacturer's specifications~~e~~ records available for inspection by the Division. [401 KAR 51:017]

b. The permittee shall install, calibrate (as applicable), maintain and operate, according to manufacturer's specifications, a monitoring device (differential pressure gauges or manometers) to determine the pressure drop across each paint booth filter, at a minimum, once a day~~shift~~ during the operation of the unit. A permanent label displaying the operating range established for each paint booth shall be posted next to the selected instrument. [401 KAR 51:017]

c. The permittee shall operate the control devices associated with each emission unit at all times that the emission unit is operating. [401 KAR 51:017]

d. The permittee shall install, operate, and maintain each Continuous Parameter Monitoring System (CPMS) for each pressure drop and/or air flow measuring device~~(e.g. each temperature sensor, pressure drop monitor, etc)~~ according to the following: [401 KAR 52:020, Section 10]
   i. The CPMS shall complete a minimum of one cycle of operation for each successive 15-minute period. The permittee shall have a minimum of four equally spaced successive cycles of CPMS operation in 1 hour.
   ii. The permittee shall determine the average of all recorded readings for each successive 3-hour period of the emission capture system ~~and add-on control device operation~~.
   iii. The permittee shall record the results of each inspection, calibration, and validation check of the CPMS.
   iv. The permittee shall maintain the CPMS at all times and have available necessary parts for routine repairs of the monitoring equipment.
   v. The permittee shall operate the CPMS and collect emission capture system and add- on control device parameter data at all times that a controlled coating operation is operating.

e. The permittee shall maintain a log detailing the operation and maintenance of the emission capture systems, add-on control devices, and continuous parameter monitoring systems (CPMS). [401 KAR 51:017]

~~f. The permittee shall develop a written startup, shutdown, and malfunction plan (SSMP) according to the provisions in 40 CFR 63.6(e)(3). The SSMP shall address startup, shutdown, and corrective actions in the event of a malfunction of the emission capture system or the add-on control devices. [401 KAR 51:017]~~

Commented [CS47]: SSM Plan requirements has been removed from the NESHAP General Provisions.

8. Alternate Operating Scenarios:
Refer to **Section H**.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Group 07 – Emergency Generators > 500 HP

Emission Unit 72 (EU72) Emergency Generator #1
Description:
Model: Caterpillar #C 27 or equivalent
Estimated Start of Construction: August 2016
Engine Rating: 1050 HP
Controls: None

Emission Unit 73 (EU73) Emergency Generator #2
Description:
Model: Caterpillar #C 27 or equivalent
Estimated Start of Construction: August 2016
Engine Rating: 1050 HP
Controls: None

Emission Unit 74 (EU74) Emergency Generator #3
Description:
Model: Caterpillar #C 4 or equivalent
Estimated Start of Construction: August 2016
Engine Rating: 56 HP
Controls: None

Description: Three diesel fired compression ignition emergency generators: two that generate 750 kW each and one that generates 40 kW. All of these generators have a displacement of less than 30 liters per cylinder.

APPLICABLE REGULATIONS:
401 KAR 51:017, Prevention of significant deterioration of air quality.
401 KAR 60:005, Section 2(2)(dddd) implementing **40 CFR 60, Subpart IIII,** *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*
401 KAR 63:002, Section 2(4)(eeee) implementing **40 CFR 63, Subpart ZZZZ,** *National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*

Note: D.C. Circuit Court [*Delaware v. EPA*, 785 F. 3d 1 (D.C. Cir. 2015)] has vacated the provisions in 40 CFR 63, Subpart ZZZZ and 40 CFR 60, Subpart IIII that contain the 100-hour exemption for operation of emergency engines for purposes of emergency demand response under 40 CFR 63.6640(f)(2)(ii)-(iii) and 40 CFR 60.4211(f)(2)(ii)-(iii). The D.C. Circuit Court issued the mandate for the vacatur on May 4, 2016.

1. **Operating Limitations:**
   a. The permittee shall meet the requirements of 40 CFR 63, Subpart ZZZZ by meeting the requirements of 40 CFR part 60, Subpart IIII, for compression ignition engines. [40 CFR 63.6590(c)(1)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

b. The permittee shall operate and maintain the emission units listed above such that they achieve the emission standards as required in 40 CFR 60.4205 over the entire life of the engine. [40 CFR 60.4206]

c. The permittee shall use diesel fuel that meets the requirements of 40 CFR 80.510(b) for nonroad diesel fuel. [40 CFR 60.4207(b)]

d. The permittee shall install a non-resettable hour meter prior to startup of the engine. [40 CFR 60.4209(a)]

e. The permittee shall comply with the emission standards specified in 40 CFR 60.4205(b) by purchasing an engine certified to the emission standards in 40 CFR 60.4205(b) for the same model year and maximum engine power. The engine shall be installed and configured according to the manufacturer's emission-related specifications, except as permitted in 40 CFR 60.4211(g). [40 CFR 60.4211(c)]

f. The permittee shall operate the emergency stationary ICE according to the requirements in 40 CFR 60.4211(f)(1) through (3). In order for the engine to be considered an emergency stationary ICE under 40 CFR 60, Subpart IIII, any operation other than emergency operation, maintenance and testing, emergency demand response, and operation in non-emergency situations for 50 hours per year, as described in 40 CFR 60.4211(f)(1) through (3), is prohibited. If the permittee does not operate the engine according to the requirements in 40 CFR 60.4211(f)(1) through (3), the engine will not be considered an emergency engine under 40 CFR 60, Subpart IIII and shall meet all requirements for non-emergency engines. [40 CFR 60.4211(f)]
   i. There is no time limit on the use of emergency stationary ICE in emergency situations. [40 CFR 60.4211(f)(1)]
   ii. The permittee may operate the emergency stationary ICE for any combination of the purposes specified in 40 CFR 60.4211(f)(2)(i) through (iii) for a maximum of 100 hours per calendar year. Any operation for non-emergency situations as allowed by 40 CFR 60.4211(f)(3) counts as part of the 100 hours per calendar year allowed by 40 CFR 60.4211(f)(2). [40 CFR 60.4211(f)(2)]
      1) Emergency stationary ICE may be operated for maintenance checks and readiness testing, provided that the tests are recommended by federal, state or local government, the manufacturer, the vendor, the regional transmission organization or equivalent balancing authority and transmission operator, or the insurance company associated with the engine. The permittee may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the permittee maintains records indicating that federal, state, or local standards require maintenance and testing of emergency ICE beyond 100 hours per calendar year. [40 CFR 60.4211(f)(2)(i)]
   iii. Emergency stationary ICE may be operated for up to 50 hours per calendar year in non-emergency situations. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per calendar year for maintenance and testing and emergency demand response provided in 40 CFR 60.4211(f)(2). Except as provided

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

in 40 CFR 60.4211(f)(3)(i), the 50 hours per calendar year for non-emergency situations cannot be used for peak shaving or non-emergency demand response, or to generate income for a facility to an electric grid or otherwise supply power as part of a financial arrangement with another entity. [40 CFR 60.4211(f)(3)]

1) The 50 hours per year for non-emergency situations can be used to supply power as part of a financial arrangement with another entity if all of the following conditions are met: [40 CFR 60.4211(f)(3)(i)]
   A. The engine is dispatched by the local balancing authority or local transmission and distribution system operator; [40 CFR 60.4211(f)(3)(i)(A)]
   B. The dispatch is intended to mitigate local transmission and/or distribution limitations so as to avert potential voltage collapse or line overloads that could lead to the interruption of power supply in a local area or region. [40 CFR 60.4211(f)(3)(i)(B)]
   C. The dispatch follows reliability, emergency operation or similar protocols that follow specific NERC, regional, state, public utility commission or local standards or guidelines. [40 CFR 60.4211(f)(3)(i)(C)]
   D. The power is provided only to the facility itself or to support the local transmission and distribution system. [40 CFR 60.4211(f)(3)(i)(D)]
   E. The permittee identifies and records the entity that dispatches the engine and the specific NERC, regional, state, public utility commission or local standards or guidelines that are being followed for dispatching the engine. The local balancing authority or local transmission and distribution system operator may keep these records on behalf of the permittee. [40 CFR 60.4211(f)(3)(i)(E)]

g. If the permittee does not install, configure, operate, and maintain the engine and control device according to the manufacturer's emission-related written instructions, or the permittee changes emission-related settings in a way that is not permitted by the manufacturer, the permittee shall demonstrate compliance as follows: [40 CFR 60.4211(g)]
   The permittee shall keep a maintenance plan and records of conducted maintenance and shall, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, the permittee shall conduct an initial performance test to demonstrate compliance with the applicable emission standards within 1 year of startup, or within 1 year after an engine and control device is no longer installed, configured, operated, and maintained in accordance with the manufacturer's emission-related written instructions, or within 1 year after the permittee changes emission-related settings in a way that is not permitted by the manufacturer. The permittee shall conduct subsequent performance testing every 8,760 hours of engine operation or 3 years, whichever comes first, thereafter to demonstrate compliance with the applicable emission standards. [40 CFR 60.4211(g)(3)]

~~h. The permittee shall prepare and maintain for EU72, EU73, and EU74, within 90 days of startup, a good combustion and operation practices plan (GCOP) that defines, measures and verifies the use of operational and design practices determined as BACT for~~

Commented [CS48]: This is an emergency generator and the facility is in compliance with the NESHAP and NSPS. Request this be removed.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

~~minimizing CO, VOC, PM, PM_{10}, and $PM_{2.5}$ emissions. Any revisions requested by the Division shall be made and the plan shall be maintained on site. The permittee shall operate according to the provisions of this plan at all times, including periods of startup, shutdown, and malfunction. The plan shall be incorporated into the plant standard operating procedures (SOP) and shall be made available for the Division's inspection. The plan shall include, but not be limited to: [401 KAR 51:017]~~

~~i. A list of combustion optimization practices and a means of verifying the practices have occurred.~~

~~ii. A list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred.~~

~~iii. A list of the design choices determined to be BACT and verification that designs were implemented in the final construction.~~

Compliance Demonstration Method:
Refer to **4. Specific Monitoring Requirements**, **5. Specific Recordkeeping Requirements**, **6. Specific Reporting Requirements**, and **7. Specific Control Equipment Operating Conditions**.

2. Emission Limitations:

a. The permittee shall comply with the emission standards for new nonroad CI engines in 40 CFR 60.4202, for all pollutants, for the same model year and maximum engine power. [40 CFR 60.4205(b)]

b. The engines listed above shall be certified to meet the certification emission standards for new nonroad CI engines for the same model year and maximum engine power in 40 CFR 89.112 and 40 CFR 89.113 for all pollutants. [40 CFR 60.4202(a)(2)]

c. The permittee shall not cause or contribute to emissions that, on an individual basis, exceed the values listed in the table below. [401 KAR 51:017]

Emission Unit (EU)	PM (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO (g/hp-hr)	VOC (g/hp-hr)
EU72	0.149	0.149	0.149	2.60	4.77
EU73	0.149	0.149	0.149	2.60	4.77
EU74	0.298	0.298	0.298	3.73	3.50

Compliance Demonstration Method:
The permittee shall install, operate, and maintain each engine such that it meets or is certified to meet the emission limits in **2. Emission Limitations(c)**. The permittee shall maintain engine certifications onsite and available for inspection by the Division.

d. Refer to **SECTION D** for source-wide HAP emission limitations.

3. Testing Requirements:

a. If the permittee conducts performance tests pursuant to 40 CFR 60, Subpart IIII, they shall do so according to 40 CFR 60.4212(a) through (e). [40 CFR 60.4212]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

i. The performance test shall be conducted according to 40 CFR part 1042, subpart F, for stationary CI ICE with a displacement of greater than or equal to 10 liters per cylinder and less than 30 liters per cylinder. [40 CFR 60.4212(a)]
ii. Exhaust emissions from stationary CI ICE that are complying with the emission standards for new CI engines in 40 CFR part 1042 shall not exceed the NTE standards for the same model year and maximum engine power as required in 40 CFR 1042.101(c). [40 CFR 60.4212(e)]

b. Pursuant to 401 KAR 59:005, Section 2(2) and 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.

4. Specific Monitoring Requirements:

a. For each emission unit listed above, the permittee shall monitor the following parameters:
i. Monthly and 12-month rolling total hours of operation;
ii. Monthly and 12-month rolling total fuel throughput;

5. Specific Recordkeeping Requirements:

a. If the emergency engine does not meet the standards applicable to non-emergency engines in the applicable model year, the permittee shall keep records of the operation of the engine in emergency and non-emergency service that are recorded through the non- resettable hour meter. The permittee shall record the time of operation of the engine and the reason the engine was in operation during that time. [40 CFR 60.4214(b)]

b. For each emission unit listed above, the permittee shall maintain records of the following:
i. Monthly and 12-month rolling total hours of operation;
ii. Monthly and 12-month rolling total fuel throughput;

6. Specific Reporting Requirements:

a. If an emergency stationary CI ICE operates or is contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in 40 CFR 60.4211(f)(2)(ii) and (iii) or operates for the purposes specified in 40 CFR 60.4211(f)(3)(i), the permittee shall submit an annual report according to the requirements in 40 CFR 60.4214(d)(1) through (3). [40 CFR 60.4214(d)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Group 08 – Storage Tanks

Emission Unit 75 (EU75) Gasoline Storage Tank
Description:
Model: Highland's Double-Wall UL-142 or equivalent
Estimated Start of Construction: August 2016
Maximum Capacity: 2,000 gallons
Controls: None

Commented [CS49]: EU75 is not installed.

APPLICABLE REGULATIONS:
401 KAR 51:017, Prevention of significant deterioration of air quality.
40 CFR 63, Subpart CCCCCC, National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Dispensing Facilities.

1. Operating Limitations:

a. The permittee shall not process more than 10,000 gallons of gasoline per month. [40 CFR 63.11111(b)]

b. The permittee shall, at all times, operate and maintain any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. Determination of whether such operation and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source. [40 CFR 63.11115(a)]

c. The permittee shall not allow gasoline to be handled in a manner that would result in vapor releases to the atmosphere for extended periods of time. Measures to be taken include, but are not limited to, the following: [40 CFR 63.11116(a); 401 KAR 51:017]
i. Minimize gasoline spills; [40 CFR 63.11116(a)(1)]
ii. Clean up spills as expeditiously as practicable; [40 CFR 63.11116(a)(2)]
iii. Cover all open gasoline containers and all gasoline storage tank fill-pipes with a gasketed seal when not in use; [40 CFR 63.11116(a)(3)]
iv. Minimize gasoline sent to open waste collection systems that collect and transport gasoline to reclamation and recycling devices, such as oil/water separators. [40 CFR 63.11116(a)(4)]

d. The permittee shall comply with the requirements of 40 CFR 63, Subpart CCCCCC upon startup. [40 CFR 63.11116(c)]

e. Portable gasoline containers that meet the requirements of 40 CFR part 59, subpart F, are considered acceptable for compliance with 40 CFR 63.11116(a)(3). [40 CFR 63.11116(d)]

f.a. The gasoline storage tank (EU75) shall be equipped with a permanent submerged fill pipe. [401 KAR 51:017]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

~~2. **Emission Limitations:**~~
~~None~~

~~3. **Testing Requirements:**~~
~~Pursuant to 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.~~

~~4. **Specific Monitoring Requirements:**~~
~~a. For EU75, the permittee shall monitor the monthly and 12-month rolling total throughput;~~

~~5. **Specific Recordkeeping Requirements:**~~
~~a. The permittee shall, upon request by the Division, demonstrate that the monthly throughput is less than the 10,000-gallon threshold level. As specified in 40 CFR 63.11112(b) and (c), recordkeeping to document monthly throughput shall begin upon startup of the affected source. Records required under 40 CFR 63.11111(e) shall be kept for a period of 5 years. [40 CFR 63.11111(e)]~~

~~b. The permittee shall keep applicable records and submit reports as specified in 40 CFR 63.11125(d) and 40 CFR 63.11126(b). [40 CFR 63.11115(b)]~~

~~c. The permittee shall keep records as specified in 40 CFR 63.11125(d)(1) and (2). [40 CFR 63.11125(d)]~~
~~i. Records of the occurrence and duration of each malfunction of operation (i.e., process equipment) or the air pollution control and monitoring equipment. [40 CFR 63.11125(d)(1)]~~
~~ii. Records of actions taken during periods of malfunction to minimize emissions in accordance with 40 CFR 63.11115(a), including corrective actions to restore malfunctioning process and air pollution control and monitoring equipment to its normal or usual manner of operation. [40 CFR 63.1125(d)(2)]~~

~~d. For EU75, the permittee shall maintain records of the monthly and 12-month rolling total throughput.~~

~~6. **Specific Reporting Requirements:**~~
~~a. The permittee is not required to submit notifications or reports as specified in 40 CFR 63.11125, 40 CFR 63.11126, or 40 CFR 63, Subpart A, but the permittee shall have records available within 24 hours of a request by the Division to document the gasoline throughput. [40 CFR 63.11116(b)]~~

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Group 08 – Storage Tanks

Emission Unit 756 (EU756) Diesel Storage Tank
Description:
Estimated Start of Construction: July 2019~~August 2016~~ Maximum Capacity: 2,000 gallons
Controls: None

APPLICABLE REGULATIONS:
401 KAR 51:017, Prevention of significant deterioration of air quality.

1. **Operating Limitations:**
   The diesel storage tank (EU76) shall be equipped with a permanent submerged fill pipe. [401 KAR 51:017]

2. **Emission Limitations:**
   None

3. **Testing Requirements:**
   Pursuant to 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.

4. **Specific Monitoring Requirements:**
   None

5. **Specific Recordkeeping Requirements:**
   None

6. **Specific Reporting Requirements:**
   None

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Group 09 – Roads
Description: Paved Roads within the PSD-prescribed source boundary. This includes emissions from trailer-truck (industrial) traffic only.
Estimated Start of Construction: September ~~August~~
2016 Controls: Vacuum sweeping

Emission Unit 76 (EU76) **Paved Roadways**

Description:
Length: 0.43 miles
Hours of Operation: 8760 hours/yr

APPLICABLE REGULATIONS:
401 KAR 51:017, Prevention of significant deterioration of air quality.
401 KAR 63:010, Fugitive emissions.

1. **Operating Limitations:**
   a. The permittee is authorized to operate 0.43 miles of paved roadways (EU76). [401 KAR 51:017]

   b. The permittee shall not cause, suffer, or allow any material to be handled, processed, transported, or stored; a building or its appurtenances to be constructed, altered, repaired, or demolished, or a road to be used without taking reasonable precaution to prevent particulate matter from becoming airborne. Such reasonable precautions shall include, when applicable, but not be limited to the following: [401 KAR 63:010, Section 3(1)]
      i. Application and maintenance of asphalt, oil, water, or suitable chemicals on roads, materials stockpiles, and other surfaces which can create airborne dusts; [401 KAR 63:010, Section 3(1)(b)]
      ii. Covering, at all times when in motion, open bodied trucks transporting materials likely to become airborne; [401 KAR 63:010, Section 3(1)(d)]
      iii. The maintenance of paved roadways in a clean condition; [401 KAR 63:010, Section 3(1)(e)]
      iv. The prompt removal of earth or other material from a paved street which earth or other material has been transported thereto by trucking or earth moving equipment or erosion by water. [401 KAR 63:010, Section 3(1)(f)]

2. **Emission Limitations:**
   a. ***Fugitive Emission Standard***: The permittee shall not cause or permit the discharge of visible fugitive dust emissions beyond the lot line of the property on which the emissions originate. [401 KAR 63:010, Section 3(2)]

   b. Refer to **SECTION D**.

3. **Testing Requirements:**
   Testing shall be conducted at such times as may be required by the Cabinet in accordance with 401 KAR 50:045.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

4. **Specific Monitoring Requirements:**
   Refer to **SECTION F** for general monitoring requirements.

5. **Specific Recordkeeping Requirements:**
   The permittee shall keep records of the dates that vacuum sweeping occurred according to **7. Specific Control Equipment Operating Conditions** and these records shall be made available to the Division upon request. Refer to **SECTION F** for general recordkeeping requirements.

6. **Specific Reporting Requirements:**
   Refer to **SECTION F** for general reporting requirements.

7. **Specific Control Equipment Operating Conditions:**
   The permittee shall vacuum sweep the pavement at least weekly, except during recent rain events, or as needed in the event of a spill. [401 KAR 51:017]

SECTION C - INSIGNIFICANT ACTIVITIES

The following listed activities have been determined to be insignificant activities for this source pursuant to 401 KAR 52:020, Section 6. Although these activities are designated as insignificant the permittee must comply with the applicable regulation. Process and emission control equipment at each insignificant activity subject to an opacity standard shall be inspected monthly and a qualitative visible emissions evaluation made. Results of the inspection, evaluation, and any corrective action shall be recorded in a log.

Description	Generally Applicable Regulation

There are no listed insignificant activities at this facility.

SECTION D - SOURCE EMISSION LIMITATIONS AND TESTING REQUIREMENTS

1. As required by Section 1b of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26; compliance with annual emissions and processing limitations contained in this permit, shall be based on emissions and processing rates for any twelve (12) consecutive months.

2. PM, PM_{10}, $PM_{2.5}$, CO, VOC, and HAP emissions, measured by applicable reference methods, or an equivalent or alternative method specified in 40 C.F.R. Chapter I, or by a test method specified in the state implementation plan shall not exceed the respective limitations specified herein.

SOURCEWIDE HAP LIMITS:

3. The permittee shall not cause or contribute to source-wide combined HAP emissions that equal or exceed 25 tons/year based on a 12-month rolling total as calculated monthly by the most recent permit application methodology.~~weekly by the following equation:~~ [Self-imposed to preclude major source status for HAP]

~~$$0.0284M_i + 0.0589B_i + 0.0211S_i + (EF_{NG} * N_i) + (0.138EF_D * D_i) + [(EF_{C1} * C_{1_i}) + (EF_{C2} * C_{2_i})] = X_i$$~~

~~$$\sum_{i=1}^{52} X_i \leq 25\ TPY$$~~

~~Where:~~

~~i = Week;~~

~~M_i = Weekly source-wide process rate for week i in tons of metal/week;~~

~~B_i = Weekly source-wide process rate for week i in pounds of binder used/week; S_i = Weekly source-wide process rate for week i in tons of shot used/week;~~

~~EF_{NG} = Sum of HAP emission factors for the combustion of Natural Gas from AP-42, Table 1.4-3 in pounds of HAP/MMscf;~~

~~N_i = Weekly source-wide natural gas usage during week i in MMscf/week;~~

~~EF_D = Sum of HAP emission factors for the combustion of Diesel fuel from AP-42, Table 3.4-3 and 3.4-4 in pounds of HAP/MMBtu;~~

~~D_i = Weekly source-wide diesel usage during week i in gallons/week;~~

~~EF_{C1} = Concentration of HAP in the pre-induction coating from the manufacturer's SDS or the emission factor determined by a representative performance test conducted according to the requirements of 401 KAR 50:045, within the last five (5) years, in pounds of HAP per pound of coating*;~~

~~C_{1i} = Weekly source-wide process rate for week i in pounds of pre-induction coating used/week;~~

~~EF_{C2} = Concentration of HAP in the post-induction coating from the manufacturer's SDS or the emission factor determined by a representative performance test conducted according to the requirements of 401 KAR 50:045, within the last five (5) years, in pounds of HAP per pound of coating*;~~

~~C_{2i} = Weekly source-wide process rate for week i in pounds of post-induction coating used/week;~~

3. ~~X_i = Source-wide total HAP emissions in tons/week~~.

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SECTION D - SOURCE EMISSION LIMITATIONS AND TESTING REQUIREMENTS (CONTINUED)

~~*Note: If the manufacturer's SDS is used for coating emission calculations and a range of values is given, the permittee shall use the maximum of the range.~~
~~Note: The constants given in the equation above are combined emission factors for the single process unit they are multiplied by. (e.g. lb HAP/ton of metal)~~

4. The permittee shall not cause or contribute to source-wide Xylene emissions that equal or exceed 10 tons/year based on a 12-month rolling total as calculated monthly ~~weekly~~ by the most recent permit application methodology~~following equation~~: [Self-imposed to preclude major source status for HAP]

~~$$0.0011B_i + (0.138EF_D * D_i) + [(EF_{C1} * C_{1_i}) + (EF_{C2} * C_{2_i})] = X_i$$~~

~~$$\sum_{i=1}^{52} X_i \leq 10\ TPY$$~~

~~Where:~~
~~i = Week;~~

~~B_i = Weekly source-wide process rate for week i in pounds of binder used/week;~~
~~EF_D = Xylene emission factor for the combustion of Diesel fuel from AP-42, Table 3.4-3 in pounds of Xylene/MMBtu;~~
~~D_i = Weekly source-wide diesel usage during week i in gallons/week;~~
~~EF_{C1} = Concentration of Xylene in the pre-induction coating from the manufacturer's SDS or the emission factor determined by a representative performance test conducted according to the requirements of 401 KAR 50:045, within the last five (5) years, in pounds of Xylene per pound of coating*;~~
~~C_{1i} = Weekly source-wide process rate for week i in pounds of pre-induction coating used/week;~~
~~EF_{C2} = Concentration of Xylene in the post-induction coating from the manufacturer's SDS or the emission factor determined by a representative performance test conducted according to the requirements of 401 KAR 50:045, within the last five (5) years, in pounds of Xylene per pound of coating*;~~
~~C_{2i} = Weekly source-wide process rate for week i in pounds of post-induction coating used/week;~~
~~X_i = Source-wide total Xylene emissions in tons/week.~~
~~*Note: If the manufacturer's SDS is used for coating emission calculations and a range of values is given, the permittee shall use the maximum of the range.~~
~~Note: The constants given in the equation above are combined emission factors for the single process unit they are multiplied by. (e.g. lb HAP/pound of binder)~~

SECTION D - SOURCE EMISSION LIMITATIONS AND TESTING REQUIREMENTS (CONTINUED)

5. The permittee shall not allow the emissions exiting the following control devices to exceed the following: [401 KAR 51:017]

Control Device (Stack)	Emission Units Controlled	Type of Control and Pollutants Controlled	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02) **	EU01~~EU02~~, EU04, EU05, EU06, EU07, EU08, EU09, EU10, ~~EU11, EU12~~, EU13, EU15, EU16, EU18	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.00210 gr/dscf; 2.6431.42 lb/hr; 11.5776.20 ton/yr	0.00210 gr/dscf; 2.6431.42 lb/hr; 11.5776.20 ton/yr	0.002060 gr/dscf; 2.6430.850 lb/hr; 11.5773.72 ton/yr
CU06 (ST07)	EU22, ~~EU23, EU24, EU26, EU27, EU28, EU29, EU30, EU31, EU32,~~ EU53~~, EU54, EU55, EU56~~	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf; 2.20816 lb/hr; 9.6739.46 ton/yr	0.0025 gr/dscf; 2.20816 lb/hr; 9.67346 ton/yr	0.00215 gr/dscf; 2.2081.30 lb/hr; 9.6735.67 ton/yr
CU08 (ST09)	EU33, EU34, EU36, ~~EU37, EU38~~, EU43, EU44, EU45, EU46, EU47, ~~EU48, EU49,~~ EU50, EU51, EU52, EU59, EU79, EU80, EU81, EU83	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf; 1.903.54 lb/hr; 8.32115.5 ton/yr	0.0025 gr/dscf; 1.903.54 lb/hr; 8.32115.5 ton/yr	0.00215 gr/dscf; 1.902.12 lb/hr; 8.3219.30 ton/yr
CU11 (ST12)	EU60, EU61, EU62, EU64, EU65	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.00125 gr/dscf; 0.5731.32 lb/hr; 2.5115.78 ton/yr	0.00125 gr/dscf; 0.5731.32 lb/hr; 2.5115.78 ton/yr	0.0015 gr/dscf; 0.573792 lb/hr; 2.5113.47 ton/yr

Note: Refer to **Section H for alternate operating scenarios.

Compliance Demonstration

The permittee shall conduct performance testing on CU01, CU06, CU08, and CU11 to demonstrate initial compliance with the BACT limits listed above. The testing shall be performed according to the requirements of 401 KAR 50:055, and repeated every 5 years. The permittee shall use 40 CFR 60, Appendix A, Method 5 for PM, 40 CFR 51, Appendix M, Method 201A/202 for PM_{10} and $PM_{2.5}$. ~~This testing shall also determine emission factors for each group of units in pounds per MMscf of natural gas used, ton of metal poured, number of parts produced, or other appropriate unifying units as approved by the Division, for use in the equation below. This testing shall be repeated for each group of units after the remaining units constructed during Phase 2 within the group are completed and operational.~~

Continuous compliance will be demonstrated by use of the bag leak detection system required in **SECTION E,** meeting the throughput limits for each process in **SECTION B**, and calculating the monthly~~lb/hr~~ and rolling 12-month ton/yr emissions using the emission

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calculation methodology presented in the air permit application. ~~from each group of units, using the following equations~~:

$$\frac{P_i * F}{h_i} = H_i$$

SECTION D - SOURCE EMISSION LIMITATIONS AND TESTING REQUIREMENTS (CONTINUED)

And:

$$\sum_{i=1}^{12} H_i * \frac{h_i}{2000} = Y$$

Where:

i = Month;

P_i = Monthly throughput for month i in the group of emission units (CU01, CU06, CU08, CU11, and CU13) in units/month;

EF = The corresponding emission factor for PM, PM_{10}, $PM_{2.5}$, CO or VOC as determined using a representative performance test conducted according to the requirements of 401 KAR 50:045, within the last five (5) years, in lb/unit;

h_i = the total number of hours operated during month i;

H_i = total PM, PM_{10}, $PM_{2.5}$, CO or VOC emissions in lb/hr.

Y = Total rolling 12-month yearly emissions in tons/year.

Note: This calculation shall include all emission units that emit PM, PM_{10}, or $PM_{2.5}$ within the group.

6. The permittee shall not allow the emissions exiting the following building vents to exceed the following: [401 KAR 51:017]

Vent	Emission Units Combined	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$	BACT for VOC	BACT for CO
BV1a & BV1b	EU01, EU05, EU06, EU13, EU14, EU18, EU35A, EU35B Uncaptured Emissions from EU07, EU08, EU09, EU10, EU 60, EU61, EU62, EU 64, EU65	0.73 lb/hr; 3.18 ton/yr (combined)	0.39 lb/hr; 1.72 ton/yr (combined)	0.20 lb/hr; 0.87 ton/yr (combined)	0.02 lb/hr; 0.07 ton/yr (combined)	0.25 lb/hr; 1.08 ton/yr (combined)
BV2a & BV2b	EU66, EU67	0.20 lb/hr; 0.88 ton/yr (combined)	0.20 lb/hr; 0.88 ton/yr (combined)	0.12 lb/hr; 0.53 ton/yr (combined)	N/A	N/A

Compliance Demonstration

The permittee shall conduct roof monitor sampling on BV1a & BV1b and BV2a & BV2b, to demonstrate initial compliance with the BACT limits listed above for PM, PM_{10}, $PM_{2.5}$, VOC, and CO. The testing shall be performed according to the requirements of 401 KAR 50:055, and repeated every 5 years. This testing shall also determine emission factors for each group of units in pounds per MMscf of natural gas used, ton of metal poured, number of parts produced, or other appropriate unifying units as approved by the Division, for use in the equation below. This testing shall be repeated for each pair of building vents after the remaining units constructed during Phase 2 within the group are completed and operational.

Commented [BEF50]: This Building Vent is over Fettling on the south side of the Foundry. This Vent is louvered and rendered inoperable.

Commented [BEF51]: This Building Vent is over the Scrap Yard of the Foundry. This Vent is louvered and rendered inoperable.

Commented [BEF52]: This Building Vent is in the center of the Machining Shop. This Vent is louvered and not operated.

Commented [BEF53]: This Building Vent was not installed.

SECTION D - SOURCE EMISSION LIMITATIONS AND TESTING REQUIREMENTS (CONTINUED)

~~Continuous compliance will be demonstrated by meeting the throughput limits for each process in **SECTION B**, and calculating the lb/hr and rolling 12-month ton/yr emissions from each group of units, using the following equations:~~

$$\frac{P_i * EF}{h_i} = H_i$$

~~And:~~

$$\sum_{i=1}^{12} H_i * \frac{h_i}{2000} = Y$$

~~Where:~~
~~i = Month;~~

~~P_i = Monthly throughput for month i in the group of emission units (BV1a & b or BV2a & b) in units/month;~~
~~EF = The corresponding emission factor for PM, PM_{10}, $PM_{2.5}$, CO or VOC as determined using a representative performance test conducted according to the requirements of 401 KAR 50:045, within the last five (5) years, in lb/unit;~~
~~h_i = the total number of hours operated during month i;~~
~~H_i = total PM, PM_{10}, $PM_{2.5}$, CO or VOC emissions in lb/hr. Y = Total rolling 12-month yearly emissions in tons/year.~~
~~Note: This calculation shall include all emission units that emit PM, PM_{10}, $PM_{2.5}$, CO or VOC within the group.~~

~~7.~~6. The permittee shall not allow the emissions exiting the following stacks to exceed the following: [401 KAR 51:017]

Stack or Vent	Emission Units Combined	BACT for VOC	BACT for CO
ST02	EU01, EU04, EU05, EU06, EU07, EU08, EU09, EU10, , EU13, EU15, EU16, EU18~~EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16~~	3.854~~0.14~~ lb/hr; 4.845~~0.61~~ ton/yr	22.044~~2.11~~ lb/hr; 31.849~~9.25~~ ton/yr
ST07	EU22, EU53	13.358 lb/hr; 24.179 ton/yr	25.30 lb/hr ;45.793 ton/yr
ST08	EU39, EU40, EU41, EU42	18.223~~0.70~~ lb/hr; 33.309~~1.67~~ ton/yr	N/A
ST09	EU33, EU34, EU36, , EU43, EU44, EU45, EU46, EU47, EU50, EU51, EU52, EU59, EU79, EU80, EU81,	33.256~~20.8~~ lb/hr; 27.378~~39.7~~	127.818~~8~~ lb/hr; 234.736~~5~~

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	EU83~~EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52,~~ ~~EU59~~	ton/yr	ton/yr

Compliance Demonstration

The permittee shall conduct performance testing on ST02, ST07, ST08, and ST09, to demonstrate initial compliance with the BACT limits listed above. The testing shall be performed according to the requirements of 401 KAR 50:055, and repeated every 5 years. The permittee shall use 40 CFR 60, Appendix A, Method 10 for CO and 40 CFR 60, Appendix A, Method 25 for VOC, or an alternate test method as approved by the Division. ~~This testing shall also~~

SECTION D - SOURCE EMISSION LIMITATIONS AND TESTING REQUIREMENTS (CONTINUED)

~~determine emission factors for each group of units in pounds per MMscf of natural gas used, ton of metal poured, number of parts produced, or other appropriate unifying units as approved by the Division, for use in the equation below. This testing shall be repeated for each group of units after the remaining units constructed during Phase 2 within the group are completed and operational.~~

~~Continuous compliance will be demonstrated by meeting the throughput limits for each process in **SECTION B**, and calculating the lb/hr and rolling 12-month ton/yr emissions from each group of units, using the following equations:~~

$$\frac{P_i * EF}{h_i} = H_i$$

~~And:~~

$$\sum_{i=1}^{12} H_i * \frac{h_i}{2000} = Y$$

~~Where:~~
~~i = Month;~~

~~P_i = Monthly throughput for month i in the group of emission units (ST02, ST08, or ST09) in units/month;~~
~~EF = The corresponding emission factor for CO or VOC as determined using a representative performance test conducted according to the requirements of 401 KAR 50:045, within the last five (5) years, in lb/unit;~~
~~h = the total number of hours operated during month i;~~
~~H_i = Total CO or VOC emissions in lb/hr.~~
~~Y = Total rolling 12-month yearly emissions in tons/year.~~
~~Note: This calculation shall include all emission units that emit CO or VOC within the group~~.

SECTION E - SOURCE CONTROL EQUIPMENT REQUIREMENTS

1. Pursuant to 401 KAR 50:055, Section 2(5), at all times, including periods of startup, shutdown and malfunction, owners and operators shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Division which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source.

2. The following requirements apply to control devices controlling foundry operations, which includes CU01~~, CU06, CU08, and CU11~~.
   a. The permittee shall install, operate, and maintain a bag leak detection system for each negative pressure baghouse or positive pressure baghouse. The permittee shall install, operate, and maintain each bag leak detection system according to the requirements in 40 CFR 63.10897(d)(1) through (3). [40 CFR 63.10897(d)]
      i. Each bag leak detection system shall meet the requirements in 40 CFR 63.10897(d)(1)(i) through (vii). [40 CFR 63.10897(d)(1)]
         1) The system shall be certified by the manufacturer to be capable of detecting emissions of particulate matter at concentrations of 10 milligrams per actual cubic meter (0.00044 grains per actual cubic foot) or less. [40 CFR 63.10897(d)(1)(i)]
         2) The bag leak detection system sensor shall provide output of relative particulate matter loadings and the permittee shall continuously record the output from the bag leak detection system using a strip chart recorder, data logger, or other means. [40 CFR 63.10897(d)(1)(ii)]
         3) The system shall be equipped with an alarm that will sound when an increase in relative particulate loadings is detected over the alarm set point established in the operation and maintenance plan, and the alarm shall be located such that it can be heard by the appropriate plant personnel. [40 CFR 63.10897(d)(1)(iii)]
         4) The initial adjustment of the system shall, at minimum, consist of establishing the baseline output by adjusting the sensitivity (range) and the averaging period of the device, and establishing the alarm set points. If the system is equipped with an alarm delay time feature, the permittee shall also adjust the alarm delay time. [40 CFR 63.10897(d)(1)(iv)]
         5) Following the initial adjustment, the permittee shall not adjust the sensitivity or range, averaging period, alarm set point, or alarm delay time. Except, once per quarter, the permittee may adjust the sensitivity of the bag leak detection system to account for seasonable effects including temperature and humidity according to the procedures in the monitoring plan required by 40 CFR 63.10897(d)(2). [40 CFR 63.10897(d)(1)(v)]
         6) For negative pressure baghouses, induced air baghouses, and positive pressure baghouses that are discharged to the atmosphere through a stack, the bag leak detector sensor shall be installed downstream of the baghouse and upstream of any wet scrubber. [40 CFR 63.10897(d)(1)(vi)]
         7) Where multiple detectors are required, the system's instrumentation and alarm may be shared among detectors. [40 CFR 63.10897(d)(1)(vii)]
      ii. The permittee shall prepare a site-specific monitoring plan for each bag leak detection system to be incorporated in the O&M plan. The permittee shall operate and maintain each bag leak detection system according to the plan at all times. Each plan shall

Commented [CS54]: This requirement is only for APCD controlling emissions from metal melting furnaces

SECTION E - SOURCE CONTROL EQUIPMENT REQUIREMENTS (CONTINUED)

address all of the items identified in 40 CFR 63.10897(d)(2)(i) through (vi). [40 CFR 63.10897(d)(2)]

1) Installation of the bag leak detection system. [40 CFR 63.10897(d)(2)(i)]
2) Initial and periodic adjustment of the bag leak detection system including how the alarm set-point will be established. [40 CFR 63.10897(d)(2)(ii)]
3) Operation of the bag leak detection system including quality assurance procedures. [40 CFR 63.10897(d)(2)(iii)]
4) Maintenance of the bag leak detection system including a routine maintenance schedule and spare parts inventory list. [40 CFR 63.10897(d)(2)(iv)]
5) How the bag leak detection system output will be recorded and stored. [40 CFR 63.10897(d)(2)(v)]
6) Procedures for determining what corrective actions are necessary in the event of a bag leak detection alarm as required in 40 CFR 63.10897(d)(3). [40 CFR 63.10897(d)(2)(vi)]

iii. In the event that a bag leak detection system alarm is triggered, the permittee shall initiate corrective action to determine the cause of the alarm within 1 hour of the alarm, initiate corrective action to correct the cause of the problem within 24 hours of the alarm, and complete corrective action as soon as practicable, but no later than 10 calendar days from the date of the alarm. The permittee shall record the date and time of each valid alarm, the time that corrective action was initiated, the correction action taken, and the date on which corrective action was completed. Corrective actions may include, but are not limited to: [40 CFR 63.10897(d)(3)]

1) Inspecting the bag house for air leaks, torn or broken bags or filter media, or any other condition that may cause an increase in emissions. [40 CFR 63.10897(d)(3)(i)]
2) Sealing off defective bags or filter media. [40 CFR 63.10897(d)(3)(ii)]
3) Replacing defective bags or filter media or otherwise repairing the control device. [40 CFR 63.10897(d)(3)(iii)]
4) Sealing off a defective baghouse department. [40 CFR 63.10897(d)(3)(iv)]
5) Cleaning the bag leak detection system probe, or otherwise repairing the bag leak detection system. [40 CFR 63.10897(d)(3)(v)]
6) Shutting down the process producing the particulate emissions. [40 CFR 63.10897(d)(3)(vi)]

SECTION F - MONITORING, RECORDKEEPING, AND REPORTING REQUIREMENTS

1. Pursuant to Section 1b-IV-1 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26, when continuing compliance is demonstrated by periodic testing or instrumental monitoring, the permittee shall compile records of required monitoring information that include:
   a. Date, place as defined in this permit, and time of sampling or measurements;
   b. Analyses performance dates;
   c. Company or entity that performed analyses;
   d. Analytical techniques or methods used;
   e. Analyses results; and
   f. Operating conditions during time of sampling or measurement.

2. Records of all required monitoring data and support information, including calibrations, maintenance records, and original strip chart recordings, and copies of all reports required by the Division for Air Quality, shall be retained by the permittee for a period of five (5) years and shall be made available for inspection upon request by any duly authorized representative of the Division for Air Quality [Sections 1b-IV-2 and 1a-8 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

3. In accordance with the requirements of 401 KAR 52:020, Section 3(1)h, the permittee shall allow authorized representatives of the Cabinet to perform the following during reasonable times:
   a. Enter upon the premises to inspect any facility, equipment (including air pollution control equipment), practice, or operation;
   b. To access and copy any records required by the permit:
   c. Sample or monitor, at reasonable times, substances or parameters to assure compliance with the permit or any applicable requirements.

   Reasonable times are defined as during all hours of operation, during normal office hours; or during an emergency.

4. No person shall obstruct, hamper, or interfere with any Cabinet employee or authorized representative while in the process of carrying out official duties. Refusal of entry or access may constitute grounds for permit revocation and assessment of civil penalties.

5. Summary reports of any monitoring required by this permit shall be submitted to the Regional Office listed on the front of this permit at least every six (6) months during the life of this permit, unless otherwise stated in this permit. For emission units that were still under construction or which had not commenced operation at the end of the 6-month period covered by the report and are subject to monitoring requirements in this permit, the report shall indicate that no monitoring was performed during the previous six months because the emission unit was not in operation [Sections 1b-V-1 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

SECTION F - MONITORING, RECORDKEEPING, AND REPORTING REQUIREMENTS (CONTINUED)

6. The semi-annual reports are due by January 30th and July 30th of each year. All reports shall be certified by a responsible official pursuant to 401 KAR 52:020, Section 23. If continuous emission and opacity monitors are required by regulation or this permit, data shall be reported in accordance with the requirements of 401 KAR 59:005, General Provisions, Section 3(3). All deviations from permit requirements shall be clearly identified in the reports.

7. In accordance with the provisions of 401 KAR 50:055, Section 1, the owner or operator shall notify the Regional Office listed on the front of this permit concerning startups, shutdowns, or malfunctions as follows:
   a. When emissions during any planned shutdowns and ensuing startups will exceed the standards, notification shall be made no later than three (3) days before the planned shutdown, or immediately following the decision to shut down, if the shutdown is due to events which could not have been foreseen three (3) days before the shutdown.
   b. When emissions due to malfunctions, unplanned shutdowns and ensuing startups are or may be in excess of the standards, notification shall be made as promptly as possible by telephone (or other electronic media) and shall be submitted in writing upon request.

8. The owner or operator shall report emission related exceedances from permit requirements including those attributed to upset conditions (other than emission exceedances covered by Section F.7 above) to the Regional Office listed on the front of this permit within 30 days. Deviations from permit requirements, including those previously reported under F.7 above, shall be included in the semiannual report required by F.6 [Sections 1b-V, 3 and 4 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

9. Pursuant to 401 KAR 52:020, Title V permits, Section 21, the permittee shall annually certify compliance with the terms and conditions contained in this permit, by completing and returning a Compliance Certification Form (DEP 7007CC) (or an alternative approved by the regional office) to the Regional Office listed on the front of this permit and the U.S. EPA in accordance with the following requirements:
   a. Identification of the term or condition;
   b. Compliance status of each term or condition of the permit;
   c. Whether compliance was continuous or intermittent;
   d. The method used for determining the compliance status for the source, currently and over the reporting period.
   e. For an emissions unit that was still under construction or which has not commenced operation at the end of the 12-month period covered by the annual compliance certification, the permittee shall indicate that the unit is under construction and that compliance with any applicable requirements will be demonstrated within the timeframes specified in the permit.
   f. The certification shall be submitted by January 30th of each year. Annual compliance certifications shall be sent to the following addresses:

SECTION F - MONITORING, RECORDKEEPING, AND REPORTING REQUIREMENTS (CONTINUED)

Division for Air Quality	U.S. EPA Region 4
Bowling Green Regional Office	Air Enforcement Branch
2642 Russellville Road	Atlanta Federal Center
Bowling Green, KY 42101	61 Forsyth St. SW
	Atlanta, GA 30303-8960

10. In accordance with 401 KAR 52:020, Section 22, the permittee shall provide the Division with all information necessary to determine its subject emissions within 30 days of the date the Kentucky Emissions Inventory System (KYEIS) emissions survey is mailed to the permittee.

SECTION G - GENERAL PROVISIONS

1. General Compliance Requirements

   a. The permittee shall comply with all conditions of this permit. Noncompliance shall be a violation of 401 KAR 52:020, Section 3(1)(b), and a violation of Federal Statute 42 USC 7401 through 7671q (the Clean Air Act). Noncompliance with this permit is grounds for enforcement action including but not limited to termination, revocation and reissuance, revision or denial of a permit [Section 1a-3 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

   b. The filing of a request by the permittee for any permit revision, revocation, reissuance, or termination, or of a notification of a planned change or anticipated noncompliance, shall not stay any permit condition [Section 1a-6 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

   c. This permit may be revised, revoked, reopened and reissued, or terminated for cause in accordance with 401 KAR 52:020, Section 19. The permit will be reopened for cause and revised accordingly under the following circumstances:
      (1) If additional applicable requirements become applicable to the source and the remaining permit term is three (3) years or longer. In this case, the reopening shall be completed no later than eighteen (18) months after promulgation of the applicable requirement. A reopening shall not be required if compliance with the applicable requirement is not required until after the date on which the permit is due to expire, unless this permit or any of its terms and conditions have been extended pursuant to 401 KAR 52:020, Section 12;
      (2) The Cabinet or the United States Environmental Protection Agency (U. S. EPA) determines that the permit must be revised or revoked to assure compliance with the applicable requirements;
      (3) The Cabinet or the U. S. EPA determines that the permit contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of the permit;
      (4) New requirements become applicable to a source subject to the Acid Rain Program.

      Proceedings to reopen and reissue a permit shall follow the same procedures as apply to initial permit issuance and shall affect only those parts of the permit for which cause to reopen exists. Reopenings shall be made as expeditiously as practicable. Reopenings shall not be initiated before a notice of intent to reopen is provided to the source by the Division, at least thirty (30) days in advance of the date the permit is to be reopened, except that the Division may provide a shorter time period in the case of an emergency.

   d. The permittee shall furnish information upon request of the Cabinet to determine if cause exists for modifying, revoking and reissuing, or terminating the permit; or to determine compliance with the conditions of this permit [Sections 1a- 7 and 8 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

   e. Emission units described in this permit shall demonstrate compliance with applicable requirements if requested by the Division [401 KAR 52:020, Section 3(1)(c)].

SECTION G - GENERAL PROVISIONS (CONTINUED)

f. The permittee, upon becoming aware that any relevant facts were omitted or incorrect information was submitted in the permit application, shall promptly submit such supplementary facts or corrected information to the permitting authority [401 KAR 52:020, Section 7(1)].

g. Any condition or portion of this permit which becomes suspended or is ruled invalid as a result of any legal or other action shall not invalidate any other portion or condition of this permit [Section 1a-14 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

h. The permittee shall not use as a defense in an enforcement action the contention that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance [Section 1a-4 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

i. All emission limitations and standards contained in this permit shall be enforceable as a practical matter. All emission limitations and standards contained in this permit are enforceable by the U.S. EPA and citizens except for those specifically identified in this permit as state-origin requirements. [Section 1a-15 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

j. This permit shall be subject to suspension if the permittee fails to pay all emissions fees within 90 days after the date of notice as specified in 401 KAR 50:038, Section 3(6) [Section 1a-10 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

k. Nothing in this permit shall alter or affect the liability of the permittee for any violation of applicable requirements prior to or at the time of permit issuance [401 KAR 52:020, Section 11(3) 2].

l. This permit does not convey property rights or exclusive privileges [Section 1a-9 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

m. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits, licenses, or approvals required by the Cabinet or any other federal, state, or local agency.

n. Nothing in this permit shall alter or affect the authority of U.S. EPA to obtain information pursuant to Federal Statute 42 USC 7414, Inspections, monitoring, and entry [401 KAR 52:020, Section 11(3) 4.].

o. Nothing in this permit shall alter or affect the authority of U.S. EPA to impose emergency orders pursuant to Federal Statute 42 USC 7603, Emergency orders [401 KAR 52:020, Section 11(3) 1.].

SECTION G - GENERAL PROVISIONS (CONTINUED)

p. This permit consolidates the authority of any previously issued PSD, NSR, or Synthetic Minor source preconstruction permit terms and conditions for various emission units and incorporates all requirements of those existing permits into one single permit for this source.

q. Pursuant to 401 KAR 52:020, Section 11, a permit shield shall not protect the owner or operator from enforcement actions for violating an applicable requirement prior to or at the time of permit issuance. Compliance with the conditions of this permit shall be considered compliance with:
(1) Applicable requirements that are included and specifically identified in this permit; and
(2) Non-applicable requirements expressly identified in this permit.

2. Permit Expiration and Reapplication Requirements

a. This permit shall remain in effect for a fixed term of five (5) years following the original date of issue. Permit expiration shall terminate the source's right to operate unless a timely and complete renewal application has been submitted to the Division at least six (6) months prior to the expiration date of the permit. Upon a timely and complete submittal, the authorization to operate within the terms and conditions of this permit, including any permit shield, shall remain in effect beyond the expiration date, until the renewal permit is issued or denied by the Division [401 KAR 52:020, Section 12].

b. The authority to operate granted shall cease to apply if the source fails to submit additional information requested by the Division after the completeness determination has been made on any application, by whatever deadline the Division sets [401 KAR 52:020, Section 8(2)].

3. Permit Revisions

a. A minor permit revision procedure may be used for permit revisions involving the use of economic incentive, marketable permit, emission trading, and other similar approaches, to the extent that these minor permit revision procedures are explicitly provided for in the State Implementation Plan (SIP) or in applicable requirements and meet the relevant requirements of 401 KAR 52:020, Section 14(2).

b. This permit is not transferable by the permittee. Future owners and operators shall obtain a new permit from the Division for Air Quality. The new permit may be processed as an administrative amendment if no other change in this permit is necessary, and provided that a written agreement containing a specific date for transfer of permit responsibility coverage and liability between the current and new permittee has been submitted to the permitting authority within ten (10) days following the transfer.

SECTION G - GENERAL PROVISIONS (CONTINUED)

4. Construction, Start-Up, and Initial Compliance Demonstration Requirements

Pursuant to a duly submitted application the Kentucky Division for Air Quality hereby authorizes the construction of the equipment described herein, ~~for Phase 1:~~ emission units EU01, ~~EU02, EU03, EU04,~~ EU05, EU06, EU07, EU08, EU09, EU10, ~~EU11,~~ EU13, EU15, EU16, EU17, EU18, EU19, EU20, EU21, EU22, ~~EU23, EU24, EU26, EU27, EU28, EU29, EU30, EU31,~~ EU33, EU34, EU35A, EU35B, EU36, ~~EU37, EU38,~~ EU39, EU40, EU41, EU42, EU43, EU44, EU45, EU46, EU47, ~~EU48,~~ EU50, EU51, EU52, EU53, ~~EU54, EU55, EU56,~~ EU57, ~~EU58,~~ EU59, EU60, EU61, EU62, EU63, EU64, EU65, EU66, EU67, EU68, EU69, EU71, EU72, EU73, EU74, EU75, ~~and~~ EU76; EU77, EU78, EU79, EU80, EU81, and EU82. ~~for Phase 2: EU06, EU09, EU10, EU12, EU14, EU16, EU32, EU34, EU35B, EU41, EU42, EU46, EU47, EU49, EU51, EU62, EU65, EU70,~~

~~and EU74~~ in accordance with the terms and conditions of permit (V-16-022).

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a. Construction of any process and/or air pollution control equipment authorized by this permit shall be conducted and completed only in compliance with the conditions of this permit.

b. Within thirty (30) days following commencement of construction and within fifteen (15) days following start-up and attainment of the maximum production rate specified in the permit application, or within fifteen (15) days following the issuance date of this permit, whichever is later, the permittee shall furnish to the Regional Office listed on the front of this permit in writing, with a copy to the Field Office Branch of the Frankfort Central Office, notification of the following:
   (1) The date when construction commenced.
   (2) The date of start-up of the affected facilities listed in this permit.
   (3) The date when the maximum production rate specified in the permit application was achieved.

c. Pursuant to 401 KAR 52:020, Section 3(2), unless construction ~~for Phase 1~~ is commenced within eighteen (18) months after the permit is issued o~~r within eighteen (18) months after March 1, 2019 for Phase 2,~~ or begins but is discontinued for a period of eighteen (18) months or is not completed within a reasonable timeframe then the construction and operating authority granted by this permit for those affected facilities for which construction was not completed shall immediately become invalid. Upon written request, the Cabinet may extend these time periods if the source shows good cause.

d. Pursuant to 401 KAR 50:055, Section 2(1)(a), an owner or operator of any affected facility subject to any standard within the administrative regulations of the Division for Air Quality shall demonstrate compliance with the applicable standard(s) within sixty (60) days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial start-up of such facility. Pursuant to 401 KAR 52:020, Section 3(3)(c), sources that have not demonstrated compliance within the timeframes prescribed in 401 KAR 50:055, Section 2(1)(a), shall operate the affected facility only for purposes of demonstrating compliance unless authorized under an approved compliance plan or an order of the cabinet.

e. This permit shall allow time for the initial start-up, operation, and compliance demonstration of the affected facilities listed herein. However, within sixty (60) days

SECTION G - GENERAL PROVISIONS (CONTINUED)

after achieving the maximum production rate at which the affected facilities will be operated but not later than 180 days after initial start-up of such facilities, the permittee shall conduct a performance demonstration on the affected facilities in accordance with 401 KAR 50:055, General compliance requirements. Testing must also be conducted in accordance with General Provisions G.5 of this permit.

f. Terms and conditions in this permit established pursuant to the construction authority of 401 KAR 51:017 or 401 KAR 51:052 shall not expire.

~~g. For those units constructed as a part of Phase 2, BACT shall be reassessed 18 months prior to commencement of construction of any Phase 2 unit and the analysis and conclusions shall be submitted to the Division for approval. [401 KAR 51:017, Section 8(4)]~~

~~h. For those units constructed as a part of Phase 2, the permittee shall re-evaluate the units for applicability of any new state or federal requirements 180 days prior to construction of any Phase 2 units and the analysis and conclusions shall be submitted to the Division for approval.~~

5. Testing Requirements

a. Pursuant to 401 KAR 50:045, Section 2, a source required to conduct a performance test shall submit a completed Compliance Test Protocol form, DEP form 6028, or a test protocol a source has developed for submission to other regulatory agencies, in a format approved by the cabinet, to the Division's Frankfort Central Office a minimum of sixty (60) days prior to the scheduled test date. Pursuant to 401 KAR 50:045, Section 7, the Division shall be notified of the actual test date at least thirty (30) days prior to the test.

b. Pursuant to 401 KAR 50:045, Section 5, in order to demonstrate that a source is capable of complying with a standard at all times, any required performance test shall be conducted under normal conditions that are representative of the source's operations and create the highest rate of emissions. If [When] the maximum production rate represents a source's highest emissions rate and a performance test is conducted at less than the maximum production rate, a source shall be limited to a production rate of no greater than 110 percent of the average production rate during the performance tests. If and when the facility is capable of operation at the rate specified in the application, the source may retest to demonstrate compliance at the new production rate. The Division for Air Quality may waive these requirements on a case-by-case basis if the source demonstrates to the Division's satisfaction that the source is in compliance with all applicable requirements.

c. Results of performance test(s) required by the permit shall be submitted to the Division by the source or its representative within forty-five days or sooner if required by an applicable standard, after the completion of the fieldwork.

SECTION G - GENERAL PROVISIONS (CONTINUED)

6. Acid Rain Program Requirements

   a. If an applicable requirement of Federal Statute 42 USC 7401 through 7671q (the Clean Air Act) is more stringent than an applicable requirement promulgated pursuant to Federal Statute 42 USC 7651 through 7651o (Title IV of the Act), both provisions shall apply, and both shall be state and federally enforceable.

   b. The permittee shall comply with all applicable requirements and conditions of the Acid Rain Permit and the Phase II permit application (including the Phase II NOx compliance plan and averaging plan, if applicable) incorporated into the Title V permit issued for this source. The source shall also comply with all requirements of any revised or future acid rain permit(s) issued to this source.

7. Emergency Provisions

   a. Pursuant to 401 KAR 52:020, Section 24(1), an emergency shall constitute an affirmative defense to an action brought for the noncompliance with the technology-based emission limitations if the permittee demonstrates through properly signed contemporaneous operating logs or relevant evidence that:
      (1) An emergency occurred and the permittee can identify the cause of the emergency;
      (2) The permitted facility was at the time being properly operated;
      (3) During an emergency, the permittee took all reasonable steps to minimize levels of emissions that exceeded the emissions standards or other requirements in the permit; and
      (4) Pursuant to 401 KAR 52:020, 401 KAR 50:055, and KRS 224.1-400, the permittee notified the Division as promptly as possible and submitted written notice of the emergency to the Division when emission limitations were exceeded due to an emergency. The notice shall include a description of the emergency, steps taken to mitigate emissions, and corrective actions taken.
      (5) This requirement does not relieve the source of other local, state or federal notification requirements.

   b. Emergency conditions listed in General Condition G.7.a above are in addition to any emergency or upset provision(s) contained in an applicable requirement [401 KAR 52:020, Section 24(3)].

   c. In an enforcement proceeding, the permittee seeking to establish the occurrence of an emergency shall have the burden of proof [401 KAR 52:020, Section 24(2)].

8. Ozone Depleting Substances

   a. The permittee shall comply with the standards for recycling and emissions reduction pursuant to 40 CFR 82, Subpart F, except as provided for Motor Vehicle Air Conditioners (MVACs) in Subpart B:
      (1) Persons opening appliances for maintenance, service, repair, or disposal shall comply with the required practices contained in 40 CFR 82.156.

SECTION G - GENERAL PROVISIONS (CONTINUED)

(2) Equipment used during the maintenance, service, repair, or disposal of appliances shall comply with the standards for recycling and recovery equipment contained in 40 CFR 82.158.
(3) Persons performing maintenance, service, repair, or disposal of appliances shall be certified by an approved technician certification program pursuant to 40 CFR 82.161.
(4) Persons disposing of small appliances, MVACs, and MVAC-like appliances (as defined at 40 CFR 82.152) shall comply with the recordkeeping requirements pursuant to 40 CFR 82.166
(5) Persons owning commercial or industrial process refrigeration equipment shall comply with the leak repair requirements pursuant to 40 CFR 82.156.
(6) Owners/operators of appliances normally containing 50 or more pounds of refrigerant shall keep records of refrigerant purchased and added to such appliances pursuant to 40 CFR 82.166.

b. If the permittee performs service on motor (fleet) vehicle air conditioners containing ozone-depleting substances, the source shall comply with all applicable requirements as specified in 40 CFR 82, Subpart B, *Servicing of Motor Vehicle Air Conditioners*.

9. Risk Management Provisions

a. The permittee shall comply with all applicable requirements of 401 KAR Chapter 68, Chemical Accident Prevention, which incorporates by reference 40 CFR Part 68, Risk Management Plan provisions. If required, the permittee shall comply with the Risk Management Program and submit a Risk Management Plan to:

RMP Reporting Center
P.O. Box 10162
Fairfax, VA 22038

b. If requested, submit additional relevant information to the Division or the U.S. EPA.

SECTION H - ALTERNATE OPERATING SCENARIOS

The alternate operating scenarios set forth below have been approved by the Division based on information supplied with the application and during the application review process. The terms and conditions of each alternate operating scenario have been developed to ensure compliance with the applicable regulations. The permittee, when making a change from one operating scenario to another, shall record contemporaneously in a log at the permitted facility a record of the scenario under which the facility is operating. The permit shield, as provided in Section G shall extend to each alternate operating scenario set forth in this Section. All conditions not specified under an alternate operating scenario shall remain unchanged from their permit values or requirements.

Commented [BEF55]: Section H can be removed in its entirety as Phase II is complete.

ALTERNATE OPERATING SCENARIO 1

Commented [BEF56]: This Alternate Scenario is based on availability of equipment during the construction phases. We have not installed EU70 and have no plans to install it.

During Phase 1 construction, the facility is exempted from 401 KAR 59:225 based on Section 6(3). Prior to starting operation in Phase 2 the facility must find an alternative paint thinner which will contain less VOC (or contain an exempt VOC compound) which at that time will ensure that the coating at the applicators will meet the requirements in 401 KAR 59:225, Section 6(1)(b): Less than 0.42 kg/l of coating (three and five-tenths (3.5) lb/gal) or the facility will comply with the requirements of 401 KAR 59:225, Section 3.

Emission Group 06 – Coating (Phase 1)

Emission Unit 68 (EU68) **Paint Booth #1**
Description:
Model: Sturm Maschinenbau ZS16
Estimated Start of Construction: August 2016
Maximum Capacity: 28.9 lb post-induction coating/hr
Controls: Paint Booth Filter (CU14)

Emission Unit 69 (EU69) **Paint Booth #2**
Description:
Model: Sturm Maschinenbau ZS16
Estimated Start of Construction: August 2016
Maximum Capacity: 28.9 lb post-induction coating/hr
Controls: Paint Booth Filter (CU15)

Emission Unit 71 (EU71) **Paint Booth #4**
Description:
Model: Sturm Maschinenbau ZS16
Estimated Start of Construction: August 2016
Maximum Capacity: 2.38 lb pre-induction coating/hr
Controls: Paint Booth Filter (CU17)

Description: Three (3) paint booths that apply coatings to finished parts. EU 68 and 69 apply a zinc paint to each part and EU71 applies both a zinc paint and a zinc solution. Each of these paint booths are equipped with electrostatic spray nozzles that achieve at least 70% transfer efficiency.

APPLICABLE REGULATIONS:
401 KAR 51:017, Prevention of significant deterioration of air quality.
401 KAR 59:010, New process operations.

SECTION H - ALTERNATE OPERATING SCENARIOS (CONTINUED)

NON-APPLICABLE REGULATIONS:

401 KAR 59:225, New miscellaneous metal parts and products surface coating operations, exempt during Phase 1 since the total potential VOC emissions from all affected facilities constructed in Phase 1 are less than 20 tons per year.

STATE-ORIGIN REQUIREMENTS:

401 KAR 63:020, Potentially hazardous matter or toxic substances, applicable with respect to each affected facility which emits or may emit Xylene, Methanol, or Zinc.

1. **Operating Limitations:**
   a. During Phase 1, the permittee shall not operate EU70.

   b. The permittee shall limit the throughput through EU68 and EU69 to a combined 92.6 tons/yr of post-induction coating on a rolling 12-month basis. [401 KAR 51:017]

   c. The permittee shall limit the throughput through EU71 to 15.5 tons/yr of pre-induction coating on a rolling 12-month basis. [401 KAR 51:017]

   d. The permittee shall limit thinner usage to a combined 4.6 tons/yr of thinner on a rolling 12-month basis. [401 KAR 51:017]

   e. Refer to **Section B**.

2. **Emission Limitations:**
   a. During Phase 1, the permittee shall not allow the combined total VOC emissions from EU68, EU69, and EU71 to exceed twenty (20) tons per year, including mixing, storage, application, drying, clean up, leaks, spills, disposal, processing, and handling. [401 KAR 59:225, Section (6)(3)]

   b. For EU68 and EU69, the permittee shall not cause or contribute to combined total emissions of PM, PM_{10}, and $PM_{2.5}$ that, on a rolling 12-month basis, equal or exceed 0.242 tons of PM, PM_{10}, or $PM_{2.5}$ per year. [401 KAR 51:017]

   c. For EU71, the permittee shall not cause or contribute to total emissions of PM, PM_{10}, and $PM_{2.5}$ that, on a rolling 12-month basis, equal or exceed 0.016 tons of PM, PM_{10}, or $PM_{2.5}$ per year. [401 KAR 51:017]

   d. For EU68 and EU69, the permittee shall not cause or contribute to combined total emissions of VOC (including contributions from thinner usage) that, on a rolling 12- month basis, equal or exceed 14.8 tons of VOC per year. [401 KAR 51:017]

   e. EU71, the permittee shall not cause or contribute to total emissions of VOC that (including contributions from thinner usage), on a rolling 12-month basis, equal or exceed 1.94 tons of VOC per year. [401 KAR 51:017]

   f. Refer to **Section B** and **Section D**.

SECTION H - ALTERNATE OPERATING SCENARIOS (CONTINUED)

ALTERNATE OPERATING SCENARIO 2

Commented [BEF57]: This Alternate Scenario can be deleted in its entirety. Baghouse CU08 has been constructed and Emission Units routed to it as described in Section B

In the initial first couple years of Phase 1 production the facility will have intermittent production with a small fraction of the capacity of the total permitted throughput of the facility. Due to the very small process exhaust requirements and intermittent operation, all baghouses with their large design air flow rates cannot be operated at the lower production rates. Subsequently several of the production operations that will be vented to a dedicated baghouse in Phase 2 will initially be ducted to another baghouse during Phase 1. Specifically, the Pouring, Cooling, Shakeout (PCS) Baghouse CU08 will not be constructed until Phase 2. When production demand is anticipated to increase and become continuous in Phase 2 of the project, Baghouse CU08 will be constructed and all process will be ducted as indicated in the original permit application and Section B of the permit (V-16-022 R1)

Temporary Phase 1 process control device routing compared to the Phase 2 design specified above:
- PCS operation emissions previously identified to have been routed and controlled by CU08, will be temporarily routed and controlled by CU01 during Phase 1 operation.
- Core Shop emissions previously identified to have been routed and controlled by CU08, will be temporarily routed and controlled by CU01 during Phase 1 operation.

The permittee may also utilize this alternate operating scenario in the event of a shut down or malfunction of CU08 after Phase 2 is complete.

Foundry Operations

Emission Unit	Description	BACT Control Device	Maximum Hourly Capacity	PSD Operating Limitations	Maximum Burner Capacity	Estimated Start of Construction
Emission Group 02 – Sand Plant						
EU33	Mold Stamping #1	Baghouse (CU01)	99.0 ton green sand/hr, each	358,380 ton green sand/yr	N/A	August 2016
EU34	Mold Stamping #2			358,380 ton green sand/yr	N/A	March 2019
EU36	Sand Classifier		3.70 ton core sand/hr, each	13,380 ton core sand/yr	N/A	August 2016
EU37	Core Silica Sand Bin			13,380 ton core sand/yr	N/A	August 2016
EU38	Core Silica Sand Weigh Hopper			13,380 ton core sand/yr	N/A	August 2016
EU43	Core Removal		3.70 ton core sand/hr	13,380 ton core sand/yr	N/A	August 2016
EU44	Dryer #1		32 lb coating/hr; 34 lb binder/hr, each	34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	August 2016

SECTION H - ALTERNATE OPERATING SCENARIOS (CONTINUED)

Emission Unit	Description	BACT Control Device	Maximum Hourly Capacity	PSD Operating Limitations	Maximum Burner Capacity	Estimated Start of Construction
EU45	Dryer #2	Baghouse (CU01)	32 lb coating/hr; 34 lb binder/hr, each	34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	August 2016
EU46	Dryer #3			34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	March 2019
EU47	Dryer #4			34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	March 2019
Emission Group 03 – Casting & Molding						
EU48	Mold Assembly #1	Baghouse (CU01)	100.8 ton total used sand/hr, each	365,070 ton total used sand/yr	N/A	August 2016
EU49	Mold Assembly #2			365,070 ton total used sand/yr	N/A	March 2019
EU50	Pouring #1		12.7 ton gray iron/hr, each	45,793 ton gray iron/yr	N/A	August 2016
EU51	Pouring #2			45,793 ton gray iron/yr	N/A	March 2019
EU52	Cooling Tunnel		25.3 ton gray iron/hr, each	91,586 ton gray iron/yr & 8.59 MMscf/yr	1 MMBtu/hr	August 2016
EU59	Forced Air Cooler			91,586 ton gray iron/yr	N/A	August 2016

Description: The processes listed above are considered to meet the definition of Foundry Operations, as defined in 40 CFR 63.10906, which means all process equipment and practices used to produce metal castings for shipment, including: Mold or core making and coating; scrap handling and preheating; metal melting and inoculation; pouring, cooling, and shakeout; shot blasting, grinding, and other metal finishing operations; and sand handling.

APPLICABLE REGULATIONS:
401 KAR 51:017, Prevention of significant deterioration of air quality.
401 KAR 59:010, New process operations.
401 KAR 63:002, Section 2(4)(bbbbb) implementing **40 CFR 63, Subpart ZZZZZ,** *National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries Area Sources.*

1. **Operating Limitations:**
   Refer to **Section B**.

2. **Emission Limitations:**
   a. The permittee shall not allow the emissions exiting the following control device to exceed the following: [401 KAR 51:017]

SECTION H - ALTERNATE OPERATING SCENARIOS (CONTINUED)

Control Device (Stack)	Emission Units Controlled	Type of Control and Pollutants Controlled	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02)	EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16, EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0010 gr/dscf; 1.42 lb/hr; 6.20 ton/yr	0.0010 gr/dscf; 1.42 lb/hr; 6.20 ton/yr	0.00060 gr/dscf; 0.850 lb/hr; 3.72 ton/yr

Compliance Demonstration:
The permittee shall conduct performance testing on CU01, while operating in this alternate operating scenario to demonstrate initial compliance with the BACT limits listed above. The testing shall be performed according to the requirements of 401 KAR 50:055, and repeated every 5 years. The permittee shall use 40 CFR 60, Appendix A, Method 5 for PM, 40 CFR 51, Appendix M, Method 201A/202 for PM_{10} and $PM_{2.5}$. This testing shall also determine emission factors for each group of units in pounds per MMscf of natural gas used, ton of metal poured, number of parts produced, or other appropriate unifying units as approved by the Division, for use in the equation below. This testing shall be repeated when the remaining units constructed during Phase 2 within the group are completed and operational.

Continuous compliance will be demonstrated by use of the bag leak detection system required in **SECTION E,** meeting the throughput limits for each process in **SECTION B** and **SECTION H**, and calculating the lb/hr and rolling 12-month ton/yr emissions from each group of units, using the following equations:

$$\frac{P_i * EF}{h_i} = H_i$$

And:

$$\sum_{i=1}^{12} H_i * \frac{h_i}{2000} = Y$$

Where:
i = Month;

P_i = Monthly throughput for month i in the group of emission units (CU01, CU06, CU08, CU11, and CU13) in units/month;
EF = The corresponding emission factor for PM, PM_{10}, $PM_{2.5}$, CO or VOC as determined using a representative performance test conducted according to the requirements of 401 KAR 50:045, within the last five (5) years, in lb/unit;
h = the total number of hours operated during month i;
H_i = total PM, PM_{10}, $PM_{2.5}$, CO or VOC emissions in lb/hr.
Y = Total rolling 12-month yearly emissions in tons/year.
Note: This calculation shall include all emission units that emit PM, PM_{10}, or $PM_{2.5}$ within the group.

b. Refer to **Section B** and **Section D**.

SECTION I – COMPLIANCE SCHEDULE

None

PSD Permit Application

Document to Support Air Permit Application Correction

Fritz Winter North America LP

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August 2025

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Section 1
Project Introduction

1.1 Document Summary

This document provides an application to correct Air Quality Permit V-16-022 R1 (Air Permit) issued on November 25, 2017, to Fritz Winter North America LP (FWNA). The necessary corrections were identified as a result of required performance testing; air permit required monitoring and recordkeeping and a detailed review of the above identified air permit.

To reduce the resources required to review and process this application, the 2017 and the 2022 applications have been used as base documents for any necessary text changes. During review of historical project information, several Kentucky Division for Air Quality (DAQ) questions, issues and concerns regarding previous applications were identified and addressed within this document. To conserve as much of the original application as possible, Figures and Tables have been consolidated into appendices.

Additional project background information is provided in this section.

1.2 Introduction

As authorized by the Air Permit, FWNA constructed and operates a gray iron foundry and machining operation to produce automotive parts, predominantly brake rotors. The facility is located in the Wilkey North Industrial Park located in Franklin, Simpson County, Kentucky. The facility is located approximately five miles north of Franklin and 13 miles south of BowlingGreen along State Route 31W.

The facility is listed under the Standard Industrial Classification (SIC) code of 3714 - Motor Vehicle Parts and Accessories. The Air Permit restricts the maximum production capacity of the foundry to 91,586 tons of molten gray iron poured per year. T**his application requests a reduction in the maximum capacity to 80,000 tons of gray iron poured per rolling 12-month summation.**

1.3 Project Background

As a result of Air Permit required initial performance testing, it was determined that certain established emission limitations were not met. This section identifies the units and pollutants where emission limitations were exceeded and provides a brief analysis of likely causes.

1.3.1 Applicable Permit Limits

In addition to and in concert with other applicable sections, Section B (Foundry Operations), Section B (Coating Operations), Section D.5, Section D.7, Section G.4.e, Section G.4.h, Section G.5. and Section H.2. of Air Quality Permit V-16-022 R1 issued on November 25, 2017, includes provisions to conduct performance (emission) testing to verify compliance with permit established emission limitations.

During 2018 and prior to the installation of Control Device CU08 with Stack ST09 (identified in a format of Control Device ID/Stack ID, e.g., CU08/ST09 throughout this document), FWNA was to

comply with Alternative Operating Scenario #2 provided for in Section H of the referenced air permit.

Alternative Operating Scenario #2 allowed the foundry to temporarily exhaust emission units EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59 to Baghouse CU01 (CU01/ST02) prior to the installation of CU08/ST09. Operating per Alternative Operating Scenario 2 is identified in the Air Permit as Phase 1 per the note at the bottom of the emission unit table provided in Section B (Foundry Operations).

When FWNA is conducting production activities under Alternative Operating Scenario #2, Air Permit Section H.2 (i.e., Phase 1) establishes PM, PM_{10} and $PM_{2.5}$ emission limitations for CU01/ST02 as shown in Table 1-1 provided in Appendix A (all report tables may be found in Appendix A).

Air Permit Section D.5 provides emission limitations for CU06/ST07 and CU11/ST12. These emission limits are effective when operating under Phase 1 as well as once Baghouse CU08 is installed (i.e., Phase 2).

Section D.5 also identifies PM, PM_{10} and $PM_{2.5}$ emission limitations for CU01/ST02 and CU08/ST09 during Phase 2 (once Baghouse CU08/ST09 has been installed and the exhaust ducts from emission unit IDs EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59 are moved from CU01/ST02 to CU08/ST09). [It is beneficial to note the facility continues to operate the existing coating operations under Section H. Alternative Operating Scenario #1].

Table 1-2 provides those Section D.5 identified PM, PM_{10} and $PM_{2.5}$ emission limitations during Phase 2 for CU01/ST02 and CU08/ST09 as well as PM, PM_{10} and $PM_{2.5}$ emission limitations during both Phase 1 and Phase 2 for CU06/ST07 and CU11/ST12.

Comparing Table 1-1 and 1-2 it is worth noting that CU01/ST02 PM, PM_{10} and $PM_{2.5}$ emission limitations did not change to reflect the movement of a number of particulate matter generating sources from CU01/ST02 to CU08/ST09 as the facility transitioned from Phase 1 to Phase 2 operations. Put another way, prior to transitioning to CU08/ST09, a number of units with condensable particulate matter emissions were ducted to CU01/ST02. The CU01/ST02 emission limitations were not altered to reflect the possibility of the increased condensable emissions associated with these units during Phase 1 operations.

Table 1-3 provides the volatile organic compound (VOC) and carbon monoxide (CO) emission limitations for CU1/ST02, CU07/ST08 (VOC only) and CU08/ST09. These emission limitations are effective during both Phase 1 and Phase 2. **Similar to the PM, PM_{10} and $PM_{2.5}$ issued identified above, CU08/ST09 has VOC and CO emissions rates that were not addressed within the emission limitations for CU01/ST02 when operating under Phase 1.**

Finally, Air Permit Section B.3.h. identifies performance test requirements for the Shakeout Conveyor (EU53) to determine compliance with VOC and CO BACT emission limits identified in Section B.2.e. and f. These emission limits are identified in Table 1-4 and apply during both Phase 1 and 2.

1.3.2 Initial Performance Test Results (CU01/ST02) – Phase 1

During Phase 1 the initial performance testing was conducted for the Melt Shop Baghouse (CU01/ST02) and Sand System Baghouse (CU06/ST07) in November 2018 and December 2018. Results of those tests are provided in Table 1-5 and Table 1-6 for CU01/ST02 and CU06/ST07, respectively.

The CU06/ST07 results provided in Table 1-6 assumed the only source of VOC and/or CO emissions were from the Shakeout Conveyor (EU53), and therefore any VOC and CO emissions determined at the stack were assigned to the Shakeout Conveyor (EU53).

The performance test of the CU01/ST02 yielded results that exceeded the permitted emission rates for PM_{10}, $PM_{2.5}$, VOC, and CO. **Again, as identified above, CU01/ST02 emission limitations in the Air Permit were not adjusted to reflect the emissions from the units temporarily ducted to CU01/ST02 during Phased 1 operations**.

The performance test of CU06/ST07 determined PM_{10} and $PM_{2.5}$ emissions exceeded applicable emission limits identified in Table 1-6 or correspondingly identified in Table 1-2.

As stated above, since CU06/ST07 was assumed to have no other sources of VOC and CO, it was inferred that those emission rates determined from testing CU06/ST07 were from the Shakeout Conveyor (EU53) and therefore indicated the Shakeout Conveyor exceeded the allowable VOC emission rate provided in Table 1-4.

1.3.3 Performance Test Results – Phase 2

Section D.5 and D.6 of the Air Permit includes provisions to repeat performance testing following completion of Phase 2 construction activities. The Phase 2 construction activities included installation of Baghouse CU08/Stack ST09 and moving exhaust ducts for several emission units from CU01/ST02 to CU08/ST09.

In October 2019, the initial performance testing of CU08/ST09 was completed and showed compliance with Phase 2 emission limitations for PM, PM_{10}, $PM_{2.5}$, VOC, and CO.

In March 2020, performance testing was conducted for CU01/ST02 and CU06/ST07. The resulting pollutants in excess of emission limitations were $PM_{2.5}$, VOC, and CO for CU01/ST02 and $PM_{2.5}$ and VOC from CU06/ST07 and EU53, respectively. Note $PM_{2.5}$ emissions from CU01/ST02 and CU06/ST02 were only slightly above permitted limitations as was the VOC emissions from EU53.

A summary of the performance test results are provided and compared to the corresponding emission limits in Table 1-7 and Table 1-8 for CU01/ST02 and CU06, respectively.

1.3.4 Performance Test Results – June 2024

FWNA's 2022 air permit modification application remained pending when the Department of Air Quality (DAQ) requested additional emissions testing. This testing was completed in June 2024, with results compared against existing permit limits in Tables 1-9 through 1-11. A summary of the test results are provided below.

CU01/ST02: The June 2024 testing confirmed earlier findings from Section 1.3.2 and 1.3.3, showing that volatile organic compound (VOC) and carbon monoxide (CO) emissions surpassed the permitted hourly limits. Particulate emissions of all types stayed within acceptable ranges. However, the facility operated at reduced capacity during testing, which likely lowered pollutant inlet concentrations and may have understated actual particulate emission rates.

CU06/ST07: Testing revealed VOC emission limits continuing to exceed the permitted hourly threshold. Similar to other units, the decreased production during the test period possibly resulted in lower incoming pollutant levels, potentially skewing particulate matter and carbon monoxide measurements.

CU08/ST09: This stack met all permit requirements for particulate concentrations and hourly emission thresholds during testing. Nevertheless, the reduced operational intensity during the test period likely influenced these measurements. To provide a more accurate assessment, VOC and CO emission rates were normalized to metal throughput. When evaluated on a metal throughput basis, the results from the June 2024 performance test exceed the implied VOC and CO emission limits specified in the Air Permit.

Conclusion: While some test results appeared acceptable under reduced production conditions, the normalized data suggests potential compliance challenges during normal operations.

1.3.5 Summary of Additional Performance Testing and Permit Implications

In addition to the above described test results, performance testing in 2018, 2019, 2020 and/or 2024 was conducted on stacks associated with the Acid Scrubber CU07 (Stack ST08), Paint Line 3 (CU14/ST15A), Paint Line 2 (CU15/ST15B), and Paint Line 1 (CU17/ST16). The findings of those tests and the permit application implications are discussed below:

Acid Scrubber (CU07/ST08)

- The November 2018 test yielded unexpected carbon monoxide (CO) emissions despite no sources of the CO emissions and no underlying permitted emission limitations. This is believed to be an anomaly and no changes to the permit application are proposed.
- The same above test showed VOC emissions at 84% of the allowable limit, even though the production rate was only 13% of the permitted capacity suggesting that higher emissions may occur at capacity.
- The June 2024 yielded VOC emissions at approximately 225% of the permitted hourly emissions limit despite a significantly reduced production rate. This again indicates a need to reassess the VOC emission limits.

Fettling Baghouse (CU11/ST12)

- Performance testing in November 2018 and June 2024 confirmed compliance with the current emission limitations.

Paint Line Stacks (CU14/ST15A, CU15/ST15B, CU16/ST16)

- June 2024 performance testing of Paint Lines 3, 2 and 1 identified particulate and VOC emissions that may exceed annual permit limits.
- Particulate exceedances are attributed to underestimating outlet grain loading values in the original application as well as the presence of condensable particulate matter.
- Testing of Paint Lines 3 and 2 indicates the coating capacity may be underestimated along with the corresponding VOC emission rates.

- The above will be addressed in the permit application revision.

1.3.6 Performance Test Results Analysis

The following provides a discussion of the likely causes of the excess emissions.

CU01 PM_{10}/$PM_{2.5}$ and CU06 $PM_{2.5}$ Emission Limit Exceedances

From reviewing the above PM results, the minimal PM outlet loading indicates the baghouses are performing extremely well at removing filterable PM. The results of the performance test show the measured filterable emission rates meet the current permit PM BACT emission limitations. Potential causes of the emissions limit exceedance include:

- The exceedances of the PM_{10} and $PM_{2.5}$ emission limitation exceedances is the results of the prior permit application's failure to address condensable particulate emissions that can occur during foundry melting, pouring, cooling and/or shakeout operations. No foundry identified in the RACT/BACT/LAER Clearinghouse (RBLC) have PM_{10} and $PM_{2.5}$ emission rates, including condensable, at these low emission rates.
- As identified above, another reason the CU01/ST02 PM_{10} and $PM_{2.5}$ emission limitations were exceeded was a result of the additional emission units and their associated condensable particulate emissions venting to CU01/ST02 during Phase 1 while no accommodation was made in the Air Permit.

To address this issue a revised BACT evaluation will be conducted to determine appropriate PM_{10} and $PM_{2.5}$ emission rates for these operations.

CU01/ST02, CU06/ST07, and CU08/ST09 VOC/CO Emission Limit Exceedance

There are several factors that likely led to the excess VOC and CO emission limitations from these stacks and the corresponding emission units. Those factors include the following:

- As identified above regarding the Phase 1 PM_{10} and $PM_{2.5}$ emission limitations, the Air Permit did not consider VOC and CO emission rates from the additional emission units vented to CU01 during Phase 1 when establishing the Air Permit limits.
- Second, VOC and CO emissions vary across pouring, cooling and shakeout based on a number of factors (e.g., cooling time). When assessing compliance with VOC and CO emission limitations it is important to aggregate the performance test results across the applicable stacks and compare those results against a grouped emissions limit for the selected units. The Air Permit did not provide for this allowance.
- Third, it does not appear the VOC Shakeout BACT determination accurately reflects the expected VOC emission rate. The prior BACT identified Waupaca Foundry as having a VOC emission limit of 0.1 lb./ton of metal. It is known Waupaca has not been able to demonstrate compliance with that emission limitation.
- Finally, we believe secondary capture of some emissions is occurring and being vented to these stacks resulting in greater emissions of VOC and CO.

CU07/ST08 VOC Emission Limit Exceedances

The emission rates in excess of the VOC hourly emissions limitation resulted in a review of the existing air pollution control device as well as correspondence with the resin supplier to develop

improved emission estimates. The revised VOC emission rates are included in this air permit application.

CU14/ST15A, CU15/ST15b and CU17/ST16 PM and VOC Emission Limits
The performance testing conducted on the stacks serving Paint Line 3 (EU68), Paint Line 2 (EU69) and Paint Line 1 (EU71) resulted in particulate and VOC emission rates that may exceed annual emission limitations. Outlet grain loading from the fabric filters have been evaluated as well as the coating usage rates for each of the three paint lines to more accurately address particulate emissions.

To address the above issues a revised BACT evaluation has been conducted to determine appropriate VOC and CO emission rates for these operations.

1.4 Revisions to Previous Permit Applications

Given the results of the above performance tests, the knowledge of other available foundry emissions information and the ongoing Air Permit Monitoring and Recordkeeping, this revised permit application has been prepared to address the above emission limitation exceedances. These changes are summarized in Tables 1-12 through 1-14 by comparing the expected revised emission rates and BACT to the same values provided in the current Air Permit.

Important aspects of each table can be summarized as follows:

- The proposed BACT values provided in Table 1-13 result in an annual decrease in potential emissions of PM, PM_{10} and $PM_{2.5}$ emissions as shown in Table 1-12.
- Table 1-14 shows an overall potential VOC and CO increase of approximately 144 and 37 tons, respectively and is the result of revisions made mainly to the CU08/ST09 VOC emission rates to incorporate increase emissions associated with organics in the green sand mold and chemically-bonded core package.

In addition to the changes identified in Tables 1-13 and 1-14, the revised application includes requests for the following changes:

- Change hourly and annual equipment capacity to rates identified in the emission calculations and application forms to reflect the below identified equipment that will not be installed.
- This application requests a reduction in the maximum capacity to 80,000 tons of gray iron poured per rolling 12-month summation.
- Remove several emission units identified in the initial and 2022 permit application that will not be installed including Scrap Drying (EU03), Scrap Cleaning (EU04), Holding Furnace #1 (EU11), Holding Furnace #2 (EU12), Pouring Furnace #2 (EU16), Mold Stamping #2 (EU34), PUCB Core Machine #3 (EU41), PUCB Core Machine #4 (EU42), Core Dryer #3 (EU46), Core Dryer #4 (EU37), Mold Assembly #2 (EU49), Mold Shop Baghouse Waste Dust Silo (EU58), Steel Shot Blasting #2 (EU62), Paint Booth #3 (EU70), Gasoline Storage Tank (EU75), Core Wash Station #3 (EU80), and Core Wash Station #4 (EU81). See Table 2-1 as referenced in Section 2.
- Change emission unit descriptions and names. See Table 2-1 as referenced in Section 2.
- Removal of BV-01A, BV-01B, BV-02A, and BV-02B as they are no longer used.
- Increase Core Release (EU39-EU42) and Core Wash #1 and #2 (EU43, EU79) to reflect actual operational capacity;

- Remove shotblast media limit (EU61 and EU62) as the emission factor is based on tons of metal processed;
- Remove bentonite, silica, bond, and other usages not material to emission calculations and associated limits;
- Increase coremaking catalyst (EU39-EU40) usage to reflect potential usage rates;
- Add Rust Preventative (EU82) and Snag Grinding (EU77 and EU78) emission units.
- Add Rotary Sprue Cleaner and Conveyors (EU83).
- Integrate Section H, Alternative Operating Scenario 1 as it is the base permitted scenario.

1.5 NSR Applicability

The initial installation and subsequently issued permit estimated emissions above the Prevention of Significant Deterioration (PSD) major source threshold for carbon monoxide (CO). In addition, the project has significant emission rates of particulate matter (PM), PM with an aerodynamic diameter of less than 10 microns (PM_{10}), and PM with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$). Revised emissions calculations now project that potential volatile organic compounds (VOCs) emissions will exceed the major source threshold.

1.6 Application Contents

This permit application includes: a process description (Section 2), a summary of the expected air emissions (Section 3), a regulatory analysis of the proposed project (Section 4), a Best Available Control Technology (BACT) analysis (Section 5), the required air quality modeling analysis (Section 6), and an assessment of other impacts (Section 7). The required Kentucky Division of Air Quality (DAQ) air permit application forms may be found in Appendix U.

Section 2
Process Description

2.1 Process Overview

The process of producing cast iron metal parts first involves fabricating a green sand mold and then filling it with molten iron. Once the metal cools and solidifies, the mold is broken to recover the cast metal part which then undergoes machining and final finishing. Figures are provided in Appendix B and Figure 2-1 provides a simplified process flow diagram of the overall foundry and machining process.

The mold making process occurs in two steps. First the outer part of the mold is formed by filling two halves of a reusable steel frame with green sand. Green sand consists of silica sand, bentonite, and a carbon blend, such as seacoal or other carbonaceous material.

Green sand is produced in the sand plant. Green sand raw materials are delivered to the facility by truck or rail and stored in silos. After both halves of the mold frame are filled with green sand, the green sand is compacted and stamped with the shape of the desired metal casting. Certain metal parts require portions of the casting to be hollow. To make these hollow sections, a separate core must be fabricated and placed in the green sand mold.

The core is subject to intense heat and stress and must be fabricated using silica sand bound by a two-part phenolic urethane binder. The core is coated with a water based abrasive resistant coating to provide additional protection during the pouring of molten metal. Once the core is placed into the bottom half of the green sand mold, the top half mold frame is placed on top of the bottom half frame and conveyed to the pouring (casting) area.

Molten gray iron is produced at the melt shop in electric induction furnaces where scrap iron and various alloys are weighed out according to the desired specifications and heated. Molten iron is then transferred into a transport ladle and moved to a pouring furnace. Here the molten iron is poured into the assembled mold. The iron filled mold is then conveyed to a cooling tunnel where the iron is allowed to cool and solidify. Once solidified, the mold is broken apart in a "shakeout" area and the metal frames are taken off and sent back to the mold assembly area for reuse. Mold and core sand is recovered and sent to the sand plant for reuse. Rough castings are further cooled by forced air and sent to the finishing area where they first go through a shot blasting (i.e., cleaning) process, followed by grinding, machining, and finally a protective zinc coating is applied.

The following sections describe the production process in more detail. Air emission units are identified with the letters “EU” followed by a unique number. Emission control units are identified with the letters “CU.” Emission points that vent to the atmosphere through a stack are identified by the letters “ST.”

Emission unit Identification numbers, descriptions and the requested description changes incorporated into this application are provided in Table 2-1. The table also includes units identified in the Air Permit and 2022 permit application that will not be installed.

Tables 2-2 and 2-3 identify the emission control unit and stack for each emission unit by identification number and description. These tables also provide the following information:

- Identify where emissions from a control device are captured and vented from an alternative control device stack;
- Similar to Table 2-1, identify where emission units have been combined with this application;
- Similar to Table 2-1, identify emission units, air pollution control devices and/or stacks that will not be installed.

2.2 Melt Shop

A process flow diagram of the melt shop operations is presented in Figure 2-2. Raw materials delivered to the melt shop for production of gray iron include; scrap steel or iron, various alloys, and fluxing agents. Raw materials are delivered to the facility by rail or truck and stored inside the building. FWNA receives scrap as a raw material. Scrap is managed per the pertinent requirements of the National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries Area Sources as codified in 40 Code of Federal Regulations (CFR) Part 63 Subpart ZZZZZZ (the Foundry Area Source Rule).

The following describes the Charge Handling emission unit (EU01). Incoming scrap is stored in bins inside the building and transferred to weigh scales for processing using an overhead crane fitted with an electromagnet. Alloys and fluxes are stored in designated areas inside the building. These additives include carbon, magnesium, molybdenum, copper, chromium, vanadium, and niobium. The alloy storage area is designed with air intakes to draw in fugitive dust and duct it to the Melt Baghouse (CU01). Alloys and additives are added manually to the furnace, according to specifications and analysis.

Induction furnaces are the cleanest form of melting iron. The scrap is melted by heat generated by passing a high amperage electric current through coils surrounding the steel jacket of the furnace. The alternating current in the coil induces an internal current in the scrap metal inside the furnace that in turn produces enough heat to melt the scrap and alloys. There are a total of four induction furnaces (EU07-EU10) with a capacity to produce 10 tons per hour (tph) of molten iron each [the Pouring operation can only process 15 tph of molten metal. Prior to heating a pivoted ring hood is lowered over the top of the furnace that collects emissions generated during the melting process. Induction furnace emissions are vented to the Melt Baghouse (CU01) then is exhausted via stack ST02.

Flux added to the molten metal extracts impurities from the melt and forms a slag at the surface of the molten metal. Since clean scrap is used there is only a small number of impurities that need to be removed. The slag is removed from the surface of the molten iron by raising the hood slightly and using a long-handled scoop, manually skimming off the top of the molten metal. The slag is placed in a small portable dumpster next to the furnace. When the iron in the induction furnace meets the specific elemental analysis and consistency, the hood is raised, and the furnace is tilted so the molten iron flows into a transport ladle.

To prepare for casting, the transport ladle is conveyed (Hot Metal Transfer – EU13) to the pouring area where the molten iron is poured from the transport ladle into an electrical induction pouring furnaces (EU15).

The induction furnaces are vented to the Melt Baghouse (CU01). Emissions for Hot Metal Transfer (EU13) and Pouring Furnace #1 (EU15) are incidentally captured by local exhaust hoods and ducted to the Melt Baghouse (CU01).

Pouring Furnace #1 is equipped with a small natural gas burner designed to initially heat the vessel when first brought into service from a cold start, and to keep the pouring spout hot so the molten iron does not cool against cold refractory when being poured.

Baghouse dust collected from the Melt Baghouse is conveyed to the Melt Baghouse Waste Dust Silo (EU17). The waste dust silo is equipped with a bin vent filter (CU02). The bin vent emission point is designated as ST03.

2.3 Sand Plant

There are three basic raw materials used to make the green sand mold (EU33). These are: silica sand; bentonite, which is a clay material that acts as the glue to hold the sand in the desired shape; and a carbon source, commonly a blend of bentonite and coal dust, commonly referred to as seacoal, or some other carbonaceous material which minimizes sand sticking to the iron casting. Figure 2-3 provides a process flow diagram of the sand plant.

Raw materials for the sand plant are delivered to the facility by truck and offloaded pneumatically into dedicated storage silos (EU19-EU21). Each silo has its own bin vent filter to control particulate emissions (CU03-CU05) and their associated emission points are ST04-ST06. From the silos, materials are pneumatically transferred to day bins and then to weigh hoppers . Specific proportions of each material is placed into the green sand mixers for blending. Recycled sand from the shakeout operation is also added to the green sand mixer. Most of the recovered sand from the shakeout process is recycled back into the green sand process. This equipment operates continuously and/or semi-continuously and the emissions unit is identified as Mold Sand Handling and Preparation (EU22).

Some of the sand (approximately 5%) must be purged from the mold sand system so that the residual core sand binder decomposition byproducts do not accumulate. This waste sand is sent to the Sand Plant Waste Sand Storage Silo (EU57) where it is later shipped off site for recycling or to a landfill. Like all other silos in the foundry the waste sand storage silo has a bin vent filter (CU10) and vents to atmosphere through emission point ST11. All of the sand system day bins, weigh hoppers and mixers are ducted to the Sand Plant Baghouse (CU06) that vents to atmosphere via stack ST07 (see Tables 2-2 and 2-3).

2.4 Core Shop

To make the required voids and hollows in a brake rotor casting, a specially shaped, structurally sound, and dimensionally stable core needs to be fabricated and placed into the green sand mold before mold assembly and casting. Figure 2-4 provides the process flow diagram for the core shop.

Core silica sand is delivered to the facility by truck and pneumatically conveyed into one of two core silica sand storage silos (EU35A-EU35B). As required, core sand is pneumatically conveyed from a silo through a sand classifier that uses air to remove fine-sized particles to produce a uniform grain-sized sand feed stream. The classified sand is then pneumatically conveyed to a sand bin for temporary storage. To make the core strong enough to remain intact during the

molten iron casting process, FWNA uses the phenolic urethane cold box (PUCB), or coldbox method of core production. In the coldbox process, silica sand from the sand bin is fed to a weigh hopper before being mixed with a two-part phenolic resin in an enclosed mixer. The sand classifier, transfer of sand to sand bin and then the transfer of sand to the weigh hopper comprise the Core Sand Handling and Preparation emission unit (EU36).

The blended core sand is then sent to one of two automated core machines (EU39-EU40). After the resin and sand mixture is shaped in the core machines, an amine gas (vaporized dimethyl propylamine) is injected through the porous phenolic urethane resin/ silica sand mixture. The amine acts as a catalyst to accelerate the curing time of the phenolic urethane resin. The amine gas remains unreacted and is ducted from each core machine to a common sulfuric Acid Scrubber (CU07) and vented to the atmosphere through stack ST08. The primary purpose of scrubbing out the amine gas is for odor control. In the core machines, an oil-based release agent is applied to the core stamping patterns to allow easy separation of the cores from their pattern. This material would likely be exhausted via CU07/ST08.

The hardened cores are then coated by dipping into a water-based, pyrophyllite slurry, which provides additional abrasive protection which is applied in one of two coating units (EU43, EU79). The coated cores are then sent through an associated natural gas fired dryer (EU44-EU45), each with a heat input of 4.0 MMBtu/hr (see Figure 2-4). Emissions from the core silica sand silos, sand classifier, sand bin, weigh hopper, core removal area and the dryers are vented to the Core/Mold Baghouse (CU08) and vented to the atmosphere through stack ST09.

2.5 Mold Assembly

The top and bottom halves of the molds, cope and drag respectively, along with the core inserts are assembled in the mold-making area (EU33).

The mold assembly process starts with an outer metal frame onto which a release agent is applied before the frame is filled and compacted with green sand. The outer shape of the desired casting is then stamped into both the cope and drag of the green sand (Mold Making #1). Cores are placed into the bottom half of the molds before the top half of the mold is placed on the bottom half to form one complete sealed mold. The mold is then conveyed to the pouring furnace. Emissions generated from the mold assembly area are ducted to the Core/Mold Baghouse (CU08) which exhausts to the atmosphere through stack ST09.

2.6 Pouring, Cooling and Shakeout

The pouring, cooling, and shakeout (PCS) process is presented in the process flow diagram in Figure 2-5. The three PCS operations occur along one continuous conveyor line. At the pouring station (Pouring #1, EU50) molten iron from the pouring furnace is transferred into the assembled molds that are brought to Pouring Furnace #1 on a rail system.

The molds are designed to allow the molten iron to be poured into one fill port. Due to the extreme heat contacting the carbon in the mold and the resin in the core, CO and volatile organic compounds (VOCs) are generated. Vents throughout the mold allow hot gases produced during the pouring process to escape which typically auto-ignite. To enhance the autoignition process, natural gas mold vent pilot burners are strategically placed at the mold conveyor to ignite the vent gases that have not already ignited.

The casted molds are then conveyed through a cooling tunnel (EU52) to allow controlled cooling of the molten iron to form the required metal crystalline structure. Emissions from the pouring stations and cooling tunnel are routed to the Core/Mold Baghouse (CU08) and exhausted via stack ST09.

Once the iron castings solidify, the mold frames are opened, and the sand mold enters the shakeout conveyor (EU53) where the molds are broken, and the castings separated from the mold and core sand. Emissions from the shakeout conveyor are vented to the Sand Plant Baghouse (CU06) which is vented to the atmosphere through stack ST07.

The sand falls onto a conveyor that returns the sand to the Sand Plant. Before returning to the Sand Plant, the used mold and core sand runs through a sand screening sieve and a sand cooler where air and water are applied to obtain the desired cooling effect and moisture content. The recycled sand is then transferred to storage where it is blended again with other raw materials to make new green sand. This equipment is all part of the Mold Sand Handling and Preparation emission unit (EU22).

Due to impurities in the sand generated from heating the resin-based core sand and carbon in the green sand, some of the recycled sand must be taken out of the sand system and disposed of. Sand destined for a landfill is temporarily stored in the Sand Plant Waste Sand Silo (EU57). Emissions from the sand screen sieve, sand cooler, used sand storage is ducted to the Sand Plant Baghouse (CU06) and vented through stack ST07. Dust generated from the Waste Sand Silo (EU57) is filtered by a silo bin vent (CU10) before exhausting to the atmosphere through stack ST11.

The Shakeout Conveyor (EU53) also breaks away the sprues from the casting which are separated and sent back to the melt shop as internal scrap. The castings are conveyed to the Forced Air Cooler (EU59) before entering the finishing stage. The air used to cool the castings is a mixture of recycled air leaving the cooling tunnel and fresh makeup air. Exhaust from the Forced Air Cooler (EU59) is routed to the Core/Mold Baghouse CU08.

2.7 Finishing

The finishing process is presented in Figure 2-6. After the castings are cooled in the forced air cooler, the parts are sorted at the Sorting Conveyor (EU60) to remove any remaining sprues. Residual sand is removed from the sprue via the Rotary Sprue Cleaner (EU83) with the sand and sprue being transferred with associated conveyors (EU83). Emissions from the Sorting Conveyor are incidentally captured via the Fettling Baghouse (CU11) with emissions from the Rotary Sprue Cleaner and associated Conveyors vented to either the Core/Mold Baghouse (CU08/ST09) or the Fettling Baghouse (CU11/ST12).

Castings are sent through an abrasive steel shot blasting unit (Steel Shot Blasting #1, EU61) to remove any remaining sand and to smooth the casting surface. Parts then enter one of two grinding stations (EU64-EU65) which removes any remaining sprue or raised surface from the casting. Also, one of two snag grinders (EU77-EU78) may be used for removing metal from the castings. Steel Shot Blasting #1 and Auto-Grinding #1/#2 are ducted to the Fettling Baghouse CU11 which vents to the atmosphere through stack ST12. Dust from the Fettling Baghouse is conveyed

to the Fettling Baghouse Waste Dust Silo (EU63) whose emissions are controlled by the Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12) via stack ST13.

Snag Grinder #1 and #2 each have their own fabric filters (CU21, CU22) that vent inside the building. Any emissions from these stacks would be captured by the Fettling Baghouse (CU11) and vented through stack ST12.

Finished castings are sent to short-term storage to allow the gray iron to fully crystallize before being sent to the final machining operation.

In the machine shop, a series of computerized Machining Lines (EU66) and a Perforation Line (EU67) machines each casting to the correct specifications and tolerances. Particulate emissions generated from the dry lathes, milling, and drilling operations are ducted to a series of fabric filters (CU13a-CU13j) that vent into the building. Emissions from these fabric filters are presumed to vent to atmosphere through stack ST16 which exhausts from the Paint Line #1 Booth Filter. Iron chips generated from the dry lathe, milling and drilling operations are collected as scrap steel and sent back to the melt shop and reused as internal scrap.

A low-VOC rust preventative may be applied to the casting prior to storage (EU82).

2.8 Painting

The painting operations are shown in Figure 2-6. Before shipping, each brake rotor is coated with a zinc coating. Two types of zinc coating operations are used. In one coating process, castings enter one of two lines, Paint Line #3 or Paint Line #2 (EU68-EU69), each consisting of an induction heating unit followed by a paint booth, then a cooling unit.

In an alternative coating process, castings enter Paint Line #1 (EU71) which applies a solids-based coating, followed by a preheater and final induction heater to cure the zinc coating.

All three paint lines are fitted with individual filters (CU14-CU15 and CU17) and ducted to stacks ST15A, ST15B and ST16, respectively.

2.9 Utilities

Utility operations are presented in Figure 2-7. The refractory lining of the ladles and furnaces are subjected to extreme wear and stress throughout the casting process and must be routinely replaced. Refractory relining of the induction furnaces and pouring furnace must be conducted in place. The new refractory lining is installed into a furnace by inserting a mold into the furnace and filling the space between the mold and the furnace wall with a refractory slurry. To cure the refractory lining, the mold inserts are removed once the refractory has set, and a portable natural gas burner (EU18) is lowered into the furnace, and the heat cures the new refractory lining.

Relining transport ladles is accomplished in the refractory repair area in the same manner using a mold insert and portable natural gas burners (EU05-EU06). The estimated heat input capacity of each refractory curing burner is 8.5 MMBtu/hr.

Three diesel fired emergency generators (EU72-EU74) provide backup emergency electrical in the event of a main electrical supply power failure.

A 1,000 gallon above ground diesel storage tank (EU75) is located on site and used to refuel company vehicles. Other liquid chemicals are received and stored in totes and drums.

Section 3
Emission Calculations

Appendix C includes a compilation of historical performance testing conducted at the site. See the Table 1-13 and 1-14 "Comments on 2025 Proposed Limits" column for information on how the historical testing was used to support the provided emission information. In summary, for particulate matter, the 95th percentile confidence interval was used to insure BACT emission limitations were likely to be met during subsequent testing. For VOC and CO, the 95th percentile confidence interval was used to determine appropriate emission factor.

- Appendix D: Presents the facility's potential emissions, reflecting worst-case scenarios for all relevant pollutants and processes.
- Appendices E and F: Contain emission factor-based calculations of uncontrolled and controlled emissions, respectively. These support the completion of DAQ Form DEP7007N, providing necessary data for both uncontrolled and post-control scenarios.
- The FWNA response to Comments may be of benefit in describing calculations and includes a suggested markup of the existing permit for DAQ use. The permit markup does not address emission units that were recently determined not to be installed. These are all identified in Tables 3-1 through 3-3.

The basis for all equipment capacities and emission factors can be found on each individual worksheet.

3.1 Potential to Emit Emission Calculations

This section outlines how potential emissions from the proposed project were quantified. Detailed calculations are provided in Appendix D, and the resulting hourly and annual emissions are summarized in Table 3-1 and Table 3-2. The emission unit-level calculations in Appendix D include footnotes that identify sources of emission factors and illustrate specific aspects of the calculation methodology.

Supporting documentation is included in Appendix G and Appendix V. Appendix G provides Safety Data Sheets (SDS) for materials used in the process, while Appendix V contains additional emissions-related data sources used to form the calculations.

Particulate matter emissions were estimated using a methodology based on maximum stack outlet grain loading and anticipated air flow rates to ensure conservative projections. Gaseous criteria pollutant emissions and organic hazardous air pollutant (HAP) emissions were determined using emission factors derived from site-specific performance testing, material vendor data, or other representative and credible sources.

3.1.1 Particulate Emissions

The majority of emissions sources associated with the proposed project release filterable particulate matter, primarily consisting of sand and dust particles generated during

casting operations and metal dust from melt shop and finishing activities. These emissions are typically controlled by fabric filters or baghouses.

All fabric filter systems are guaranteed by vendors to limit exhaust air concentrations to no more than 0.003 grains per dry standard cubic foot (gr/dscf). This outlet grain loading value is substantiated in Section 5 (Best Available Control Technology) of the application and is used to calculate particulate emissions by multiplying the maximum design flow rate of exhaust air with continuous operation assumed at 8,760 hours per year to reflect maximum potential emissions.

Condensable particulate matter may also be present in exhaust streams from process operations such as melting, pouring, mold cooling, and shakeout (collectively referred to as PCS), due to incomplete combustion of organic materials in molds or cores. Additionally, natural gas-fired burners contribute to potential condensable emissions. These factors were incorporated into the outlet grain loading assumptions. Particulate emissions may occur at several process locations, including induction furnaces, pouring stations, grinding stations, and conveyor systems. For units equipped with baghouse control, ductwork and hooding systems are designed in accordance with standard engineering practices to ensure particulate capture through primary or secondary hood systems, minimizing emissions to the workplace atmosphere.

Allowances for condensable particulate matter have been provided for any emission unit where condensable particulates are expected.

To calculate controlled PM, PM_{10} and $PM_{2.5}$ emissions (i.e., stack emissions), the application uses the same methodology as the original application. The APCD air volume (in acfm) and BACT-established outlet grain loadings (in gr/dscf) along with the stack temperature are used to determine hourly [Eq. 1] and annual [Eq. 2] stack emission rates from each control device. [differences in standard to actual barometric pressure and moisture content are negligible and therefore ignored]. Again Tables 2-2 and 2-3 identify the emission unit air pollution control assignments.

$$PM\ \left(\frac{lb}{hr}\right) = \frac{gr}{dscf} \times acfm\ \times (460°\mathrm{F} + 70°\mathrm{F})/(460°\mathrm{F} + stack\ temp°\mathrm{F})\ \text{[Eq. 1]}$$

$$PM\ (tpy) = PM\ \left(\frac{lb}{hr}\right) \times \frac{hours}{year}\ \text{[Eq. 2]}$$

Using an emission factor and an APCD control efficiency to quantify stack particulate emissions would not be appropriate as inlet conditions (inlet mass emissions, moisture content, particle size, etc.) are unknown and the relatively limited high quality emission factors.

Emphasizing the above, excluding the amine catalyst used at EU39 and EU40, control efficiencies are not used to calculate any emissions but only prepared to complete Form DEP7007N due to the relatively limited high quality emission factors and unknown control efficiencies.

3.1.2 Gaseous Criteria Pollutants and Organic HAP Emission Calculations

Hazardous Air Pollutants (HAPs), Volatile Organic Compounds (VOCs), and Carbon Monoxide (CO) emissions primarily originate from PCS operations, which include pouring, mold cooling, and shakeout activities. These emissions result from the incomplete combustion of gases produced during the introduction of molten iron into molds, the oxidation of carbon in green sand, and the thermal breakdown of organic binders in cores.

To estimate emissions from both the PCS process and the core shop, FWNA relied on methodologies developed by the Casting Emission Reduction Program (CERP)—a joint industry–EPA initiative formed in the 1990s to establish accurate emission factors and support emissions reduction strategies. Relevant published data through 2007 were used as the foundation for emission calculations.

While installed equipment has the theoretical capacity to process up to 15.0 tons per hour, such throughput is not continuously achievable due to the high maintenance demands of the system. As a result, FWNA has accepted a federally enforceable annual production limit of 80,000 tons of metal. Based on this cap and CERP-derived emission factors, the facility qualifies as a minor source of HAPs.

Paint usage also contributes to VOC and HAP emissions, and the hourly equipment capacity was determined along with the projected maximum annual usage. Safety Data Sheets (SDSs) for major raw materials, provided in Appendix G, were used to identify paint constituents and verify the presence of HAPs and VOCs in the coatings.

3.2 Uncontrolled and Controlled Emission Calculations – Form DEP7007N

Preparation of DAQ Form DEP7007N required estimating both uncontrolled and controlled potential particulate emissions on an hourly and annual basis.

Uncontrolled emissions were developed and documented in Appendix E, despite challenges posed by the limited availability and reliability of emissions data—particularly regarding the condensable fraction, which can range from negligible to significant.

Controlled emissions, presented in Appendix F, were calculated using particulate control efficiencies for each fabric filter rather than relying on the control device outlet grain loadings from Appendix D. These control efficiencies were derived by comparing the uncontrolled emissions from each source served by a given fabric filter to the estimated controlled emissions from that device, as documented in Appendix D. The resulting control efficiency was then applied to each emissions unit controlled by the respective fabric filter.

For emissions units such as the Melt and Core/Mold Baghouse Waste Dust Silo (EU17), Sand Plant Baghouse Waste Sand Silo (EU57), and Fettling Baghouse Waste Dust Silo (EU63), which receive dust from associated fabric filters, it was assumed that these units would not exist under an uncontrolled emissions scenario. To estimate throughput for these silos under controlled conditions, the stack emissions from each air pollution control device were subtracted from the calculated inlet loading to the respective baghouse, based on the uncontrolled emissions of the units served.

Additionally, a default particulate control efficiency of 99% was applied to any fabric filter that vents inside the building.

Section 4
Regulatory Analysis

4.1 Prevention of Significant Deterioration (PSD)

The FWNA iron foundry and machining operations are located in Simpson County, Kentucky which is an attainment area for all criteria pollutants. The air quality in neighboring counties is also in attainment with National Ambient Air Quality Standards (NAAQS).

The FWNA foundry is presumed one of the 28 PSD source categories and one hundred tpy of emissions of any PSD regulated pollutant (PM_{10}, NO_x, CO, SO2, or VOC) designates the facility as a major source under PSD.

As identified in Table 1-12, the foundry has the potential to emit over one hundred tpy of CO and VOC therefore the facility is designated as a major source, and the foundry construction was subject to PSD review.

Once the facility is designated as a major source other pollutants are evaluated to determine if emissions exceed their respective significant emission rates (SER). As shown in Table 1-12 SERs are exceeded for PM, PM_{10}, and $PM_{2.5}$. As a result, PM, PM_{10}, $PM_{2.5}$, CO and VOC are subject to PSD review.

This section reviews other potential applicable regulations.

4.2 National Emission Standards for Hazardous Air Pollutants (NESHAPs)

4.2.1 NESHAPS for a minor source of HAP (40 CFR 63 Subpart ZZZZZ-NESHAP for Iron and Steel Foundries Area Sources):

The rule provides emission limitations and work practices for both small foundries and large foundries. The FWNA foundry is a large foundry as defined by the rule. In summary this NESHAP requires the iron foundry to:

1) Develop a scrap management program that ensures no mercury switches are present in the scrap;
2) The scrap cannot contain chlorinated plastic material, and must be free of liquids, engine blocks, or oil filters;
3) Methanol cannot be used in the green mold process;
4) Particulate matter cannot exceed 0.1 pound per ton of metal processed from the furnace operation;
5) Opacity cannot exceed 20% from the furnace baghouse; and
6) All process baghouses for affected units must be monitored with a baghouse leak detector.

4.2.2 NESHAPS for a major and minor sources of HAP (40 CFR 63 Subpart ZZZZ-NESHAP for Stationary Reciprocating Internal Combustion Engines RICE)):

This subpart regulates HAP emissions from RICE located at major sources and area sources of HAP. FWNA installed three emergency generators and therefore is subject to this subpart. The rule requires compliance with NSPS IIII and limits non-emergency operation to less than one hundred hours per year.

4.2.3 Subpart CCCCCC—National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Dispensing Facilities

This rule regulates gasoline storage tanks at area sources by imposing certain emission limits and management practices. FWNA no longer plans to install a gasoline tank and therefore this rule is not applicable.

4.2.4 Subpart XXXXXX—National Emission Standards for Hazardous Air Pollutants Area Source Standards for Nine Metal Fabrication and Finishing Source Categories

This rule regulates various metal product industries requiring certain operational practices that would reduce metal HAP emissions. The rule is not applicable to the FWNA foundry because its operation does not fit any category described in Table 1 of the rule.

4.2.5 Subpart HHHHHH—National Emission Standards for Hazardous Air Pollutants: Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources

This rule applies to area sources where surface coating of metal occurs, which does apply to the FWNA foundry. However, the rule focuses on regulating emissions of certain HAP metals namely, Chromium, Lead, Manganese, Nickel, or Cadmium. The coating used at the FWNA finishing operations will be a zinc coating and does not contain any of these metals, at least not to the degree that makes it applicable to the rule (<0.1% for each metal). FWNA will continue to document that all coatings used has metal content less than this concentration.

4.3 New Source Performance Standards (NSPS)

4.3.1 40 CFR 60 Subpart Z—Standards of Performance for FerroalloyProduction Facilities

40 CFR 60 Subpart Z, Section §60.260 - Applicability and designation of affected facility:
(a) The provisions of this subpart are applicable to the following affected facilities: Electric submerged arc furnaces which produce silicon metal, ferrosilicon, calcium silicon, silicomanganese zirconium, ferrochrome silicon, silvery iron, high-carbon ferrochrome, charge chrome, standard ferromanganese, silicomanganese, ferromanganese silicon, or calcium carbide; and dust-handling equipment.

Since the FWNA foundry utilizes electric induction furnaces to melt scrap steel and keep the iron molten and not arc furnaces this rule does not apply.

4.3.2 40 CFR 60 Subpart IIII - Standards of Performance for StationaryCompression Ignition Internal Combustion Engine

This rule was finalized on July 11, 2006. It provides performance standards for diesel stationary compression ignition (CI) engines, including emergency engines that commence reconstruction or modification after the proposal date of July 11, 2005, or construction of a new engine after April 1, 2006. The rule provides performance standards for both engine manufacturers and operators. Engine operators must meet the specified emission standards and fuel type specifications in the rule. FWNA has installed three emergency generators and therefore FWNA is subject to this subpart. Other than required for maintenance purposes, these generators only operates when there is a power outage at the facility. The purchased engines are in compliance with 40 CFR 60.4202 which specifies required emission standards for emergency engines. The engines will continue to be limited to run a total of one hundred hours per year of non-emergency operation.

4.4 State Specific Rules

The FWNA facility is located in Simpson County, which is in the Commonwealth of Kentucky, South Central Kentucky Intrastate Air Quality Control Region.

Several state specific rules that are potentially applicable to this facility are discussed below.

4.4.1 401 KAR 51:010 Attainment Status Designations

The FWNA facility is located in Simpson County which has air quality standards for all regulated pollutants that are “Better than standard” and the county is not subject to additional non-attainment compliance requirements.

4.4.2 401 KAR 51:017. Prevention of Significant Deterioration of Air Quality.

The facility’s PTE emissions are such that the facility is subject to this regulation. The facility will continue to comply with this regulation.

4.4.3 401 KAR 52:020. Title V Permits.

The facility’s PTE emissions are such that the facility is subject to this regulation. The facility will continue to comply with this regulation.

4.4.4 401 KAR 52:050. Permit Application Forms.

The facility will complete Kentucky "Forms DEP7007AI to DD, Permit Application to Construct or Operate an Air Contaminant Source" as found in this permit application.

4.4.5 401 KAR 55:005. Significant Harm Criteria.

The purpose of this chapter is designed to prevent ambient pollutant concentrations at any location from reaching the following levels which could cause significant harm to the health of persons. The FWNA facility will continue to comply with this requirement.

4.4.6 401 KAR 55:020. Abatement Strategies.

The FWNA facility will prepare, when requested by the director in writing, standby plans for reducing the emission of air pollutants during episode periods (air pollution alert, warning, and emergency). Standby plans shall be designed to reduce or eliminate emission of air pollutants in accordance with the objectives set forth in Sections 2 to 4 of this administrative regulation.

4.4.7 CFR Part 61 National Emission Standards for Hazardous Air Pollutants.

The FWNA facility does not emit pollutants regulated under 40 CFR 61.01 through 61.139 and 61.160 through 61.358, Subparts A through L and N through FF and is therefore not subject to this regulation.

4.4.8 401 KAR 59:005. General Provisions.

The provisions of this chapter apply to the owner or operator of any new source for which a standard of performance has been promulgated. The FWNA facility will continue to comply with the requirements of this chapter, including Performance Tests, Notification and Recordkeeping, and Monitoring Requirements.

4.4.9 401 KAR 59:010. New Process Operations.

The provisions of this administrative regulation apply to each affected facility or source, associated with a process operation, which is not subject to another emission standard with respect to particulates in this chapter. The FWNA facility will continue to comply with the following Standard for Particulate Matter.

(1) Opacity standard: No person shall cause, suffer, allow, or permit any continuous emission into the open air from a control device or stack associated with any affected facility which is equal to or greater than twenty (20) percent opacity.

(2) Mass emission standard: For emissions from a control device or stack no person shall cause, suffer, allow, or permit the emission into the open air of particulate matter from any affected facility which is in excess of the quantity specified in Appendix A to this administrative regulation.

Interpolation of the data for process weight rates up to 60,000 lb/hr shall be accomplished by use of the equation:

$$E = 3.59P^{0.62}$$

and interpolation and extrapolation of the data for process weight rates in excess of 60,000 lb/hr shall be accomplished by the use of the equation:

$$E = 17.31P^{0.16}$$

Where: E = rate of emission in lb/hr and P = process weight rate in tons/hr.

The FWNA facility will continue to comply with the requirements of this regulation.

4.4.10 401 KAR 59:050. New Storage Vessels for Petroleum Liquids.

This rule requires specific performance standards for operation of petroleum storage tanks. It applies only if the total storage is greater than 40,000 gallons. Since the FWNA facility will store less than that, this rule does not apply.

4.4.11 401 KAR 59:105. New Process Gas Streams.

The provisions of this administrative regulation shall apply to each affected facility which means any process gas stream which is not elsewhere subject to a standard of performance within this chapter with respect to hydrogen sulfide, sulfur dioxide, or carbon monoxide.

The FWNA facility does not generate a waste gas stream containing hydrogen sulfide or sulfur dioxide. As regards to CO, the rule only applies if the facility emits more than 1,000 tpy of CO and is in a non-attainment area. Neither of these conditions are true and therefore FWNA is not subject to this regulation.

4.4.12 401 KAR 59:225. New Miscellaneous Metal Parts and Products Surface Coating Operations.

The FWNA facility is an "Affected facility" as it has a coating line located at an original equipment manufacturing industry which applies coatings to metal substrates not elsewhere subject to administrative regulation, and the facility is located in a county designated attainment for ozone in 401 KAR 51:010.

Standard for VOCs: No person shall cause, allow, or permit an affected facility to discharge into the atmosphere more than fifteen (15) percent by weight of the VOCs net input into the affected facility.

The FWNA facility is exempted from this regulation based on the following:

> (b) Less than 0.42 kg/l of coating (three and five-tenths (3.5) lb/gal). The VOC content of FWNA coatings is: 3.4 lb/gal or less.

4.4.13 401 KAR 60:005. 40 CFR Part 60 standards of performance for new stationary sources.

The FWNA facility is subject to the NSPS rules discussed in Section 4.3.

4.4.14 401 KAR 63:002. 40 CFR Part 63 national emission standards for hazardous air pollutants.

The FWNA facility is subject to the NESHAPs discussed in section 4.2.

4.4.15 401 KAR 63:005. Open burning.

This administrative regulation establishes requirements for the control of open burning. The FWNA facility will continue to comply with the requirements of this regulations.

4.4.16 401 KAR 63:010. Fugitive Emissions.

Under this Standards for Fugitive Emissions. (1) No person shall cause, suffer, or allow any material to be handled, processed, transported, or stored; a building or its appurtenances to be constructed, altered, repaired, or demolished, or a road to be used without taking reasonable precaution to prevent particulate matter from becoming airborne; (2) No person shall cause or permit the discharge of visible fugitive dust emissions beyond the lot line of the property on which the emissions originate; (3) When dust, fumes, gases, mist, odorous matter, vapors, or any combination thereof escape from a building or equipment in such a manner and amount as to cause a nuisance or to violate any administrative regulation, the secretary may order that the building or equipment in which processing, handling and storage are done be tightly closed and ventilated in such a way that all air and gases and air or gas-borne material leaving the building or equipment are treated by removal or destruction of air contaminants before discharge to the open air.

In addition, (3) at all times when in motion, open bodied trucks, operating outside company property, transporting materials likely to become airborne shall be covered, and; (4) No one shall allow earth or other material being transported by truck or earth moving equipment to be deposited onto a paved street or roadway.

The FWNA facility will continue to comply with the requirements of this regulation and in addition will continue to ensure that all internal roadways used for truck traffic are paved and these roadways cleaned on a regular basis.

4.4.17 401 KAR 63:020. Potentially Hazardous Matter or Toxic Substances.

FWNA is subject to the provisions of this administrative regulation because it emits or may emit potentially hazardous matter or toxic substances, provided such emissions are not elsewhere subject to the provisions of the administrative regulations of the Division for Air Quality.

FWNA will continue to control potentially hazardous matter and toxic substances. It will not allow the facility to emit potentially hazardous matter or toxic substances in such quantities or duration as to be harmful to the health and welfare of humans, animals, and plants. The FWNA facility will continue to comply with the requirements of this regulation as shown in Section 6 of this document.

4.4.18 401 KAR 68:010. Chemical Accident Prevention - General provisions.

The FWNA facility does not store or use chemicals in quantities which make them subject to Federal regulation 40 CFR Part 68 - General provisions for chemical accident prevention and risk management. Therefore, this regulation does not apply to the facility.

Section 5
BACT Analysis

5.1 Changes from Prior Application

As discussed in Section 1, this document provides an application to correct Air Quality Permit V-16-022 R1 (Air Permit) issued on November 25, 2017, to Fritz Winter North America LP (FWNA). The necessary corrections to the Air Permit were identified as a result of required performance testing, Air Permit required monitoring and recordkeeping and a detailed review of the Air Permit.

The revised permit application has been prepared to address a number of issues including necessary changes to raw material usages and emission limitations. **When compared to the previous application, the requested change in total emissions by this application is approximately the following:**

- PM emissions decrease 15 tpy
- PM_{10} emissions decrease 19 tpy
- $PM_{2.5}$ emissions decrease 2.5 tpy
- SO_2 emissions decrease less than 1 tpy
- NO_x emissions decrease 13 tpy
- VOC emissions increase of 144 tpy
- CO emissions increase of 38 tpy
- Lead emissions decrease of less than 0.25 tpy.

With the emissions change, there is limited changes to the previous BACT determinations as identified in Tables 1-13 and 1-14.

As shown in Table 1-12, BACT emission limitations identified in Table 1-13 result in a decrease of approximately 15 and 19 tpy for PM and PM_{10} respectively while $PM_{2.5}$ emissions decreased by 2.5 tpy.

Table 1-12 identifies VOC emission increases over current levels of approximately 144 tpy. The increase associated with VOC emissions are the result of the following changes:

- For Electric Induction Furnaces (EU07 through EU10), the addition of process VOCs emissions and/or secondary capture (in addition to combustion emissions identified in the original application) resulting in an increase from 0.61 to approximately 5,5 tpy.
- For Pouring #1 (EU50) and Mold Cooling (EU52), an emission factor change increased emissions from 17.3 to approximately 142 tpy.
- For Shakeout (EU53), as will be discussed below, correcting the emission factor results in an increase from 4.58 to approximately 22 tpy.
- For PUCB Coremaking #1 through #2 (EU39-EU40) correcting emission factor and increasing material usage increased emissions from 1.6 to approximately 7.8 tpy.

Table 1-12 shows overall CO potential emissions increase of 38 tpy. This CO emissions increase is predominantly resulting from additional process emissions or secondary capture (in addition to

combustion emissions identified in the original application) at the Electric Induction Furnaces (EU07 through EU10). This increases the CO emissions by 55 tpy to approximately 64 tpy at CU01/ST02.

Excluding the increase in VOC emissions, given the limited emissions increase identified above and absence of new technology and/or work practices for the pollutants of concern, there are no significant changes to the BACT analysis previously submitted as discussed in the following sections.

5.2 BACT Introduction

Sources undergoing a PSD review must apply BACT to any new or modified emission unit that emits a PSD-triggered pollutant. Federal PSD regulations define BACT as:

… an emission limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Clean Air Act, which would be emitted from any proposed major stationary source or major modification, which the administrator on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of each such pollutant.

The determination proceeds to state that no BACT determination may be less stringent than the applicable NSPS, NESHAP, or State Implementation Plan (SIP) limits. Also, the definition allows a design or work practice to be established as BACT.

On December 1, 1987, the US EPA Assistant Administrator for Air and Radiation issued a memorandum that implemented certain program initiatives designed to improve the effectiveness of the New Source Review (NSR) programs in the confines of existing regulations and SIPs. Among these was the "top-down" method for determining BACT. The top-down process provides that available control technologies be ranked in descending order of control effectiveness. The first step of this process is to evaluate the most stringent or "top" alternative. This represents BACT, unless it can be demonstrated, and the permitting authority agrees, that technical considerations, energy, environmental, or economic impacts justify a conclusion that the most stringent technology is not "achievable" in a particular case. If the most stringent technology is eliminated in this fashion, then the next most stringent alternative is considered, and so on, until the most appropriate control strategy is selected for each source.

BACT is required for any emission unit that emits a PSD-regulated pollutant above the respective significant emission rate (SER). Table 5-1 identifies PSD-regulated pollutants exceeding the SER as particulate matter (PM), particulate matter equal to or less than 10 microns in diameter (PM_{10}), particulate matter equal to or less than 2.5 microns in diameter ($PM_{2.5}$), volatile organic compounds (VOCs) and carbon monoxide (CO). These are the same pollutants identified in the prior air permit applications.

5.3 Study Methodology

The requirement to conduct a BACT analysis is provided for in 401 KAR 51:107 Section 8 (2) and states a "new major stationary source shall apply BACT for each regulated NSR pollutant for which the source has the potential to emit in significant amounts."

401 KAR 51_001 Section 1(25) defines BACT as "an emissions limitation, including a visible emission standard, based on the maximum degree of reduction for each regulated NSR pollutant that will be emitted from a proposed major stationary source or major modification and:

(a) Is determined by the cabinet pursuant to 401 KAR 51:017, Section 8, after considering energy, environmental, and economic impacts and other costs, to be achievable by the source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of that pollutant;
(b) Does not result in emissions of a pollutant that would exceed the emissions allowed by an applicable standard codified in 40 C.F.R. Parts 60 and 61; and
(c) Is satisfied by a design, equipment, work practice, or operational standard or combination of standards approved by the cabinet, if:
    1. The cabinet determines pursuant to 40 C.F.R. 51.166(b)(12) that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible;
    2. The standard establishes the emissions reduction achievable by implementation of the design, equipment, work practice, or operation; and
    3. The standard provides for compliance by means that achieve equivalent results.

From the definition above, BACT is "an emission limitation," not an emission reduction rate or a specific technology. BACT is determined on a case-by-case basis and therefore does not require the installation of any specific control device. While BACT is prefaced upon the application of technologies reflecting the maximum reduction rate achievable, the result of BACT is as stated above "an emission limit."

In addition, the above BACT definition identifies that in cases where the implementation of an emission limitation is deemed infeasible, "…a design, equipment, work practice, or operation" may be prescribed as a BACT standard."

BACT is to be established at the lowest value that is achievable. However, there is an important distinction between emission rates achieved at a specific time on a specific unit, and an emission limitation that a unit must be able to meet continuously over its operating life. DC Circuit Court of Appeals, in National Lime Association v. EPA, 627 F.2d 416, 431 n.46 (D.C. Cir. 1980), stated that where a statute requires that a standard be "achievable," it must be achievable "under most adverse circumstances which can reasonably be expected to recur."[1]

Similar conclusions have been made by USEPA in previous PSD permits. USEPA has stated "Agency guidance and our prior decisions recognize a distinction between, on the one hand, measured 'emissions rates,' which are necessarily data obtained from a particular facility at a specific time, and on the other hand, the 'emissions limitation' determined to be BACT and set forth in the permit, which the facility is required to continuously meet throughout the facility's life. Stated simply, if there is uncontrollable fluctuation or variability in the measured emission rate, then the lowest measured emission rate will necessarily be more stringent than the "emissions limitation" that is "achievable" for that pollution control method over the life of the facility. Accordingly, because the "emissions limitation" is applicable for the facility's life, it is wholly appropriate for the permit issuer to consider, as

[1] Sierra Club v. USEPA (97-1686)

part of the BACT analysis, the extent to which the available data demonstrate whether the emissions rate at issue has been achieved by other facilities over a long term."[2]

It follows from above that BACT should be established at the lowest feasible emission rate recognizing that the emission unit must comply with the emission rate or limit on a continuous basis for the life of the unit or air permit. It follows then that any actual performance data gathered for an emission unit must be viewed carefully, as rarely will the data be adequate to truly assess the performance that a unit will achieve during its entire operating life. While statistical variability of actual performance can be used to infer what is "achievable," such testing requires a significant effort compiled over a significant period and that robust of a dataset is usually and largely unavailable at the time of the BACT analysis.

The BACT review is conducted using USEPA's prescribed "Top Down" method as outlined in the 13 October 1989 guidance document, "Transmittal of Background Statement on Top Down Best Available Control Technology (BACT)", issued by John Calcagni, Director, the United States Environmental Protections Agency's (USEPA's) Air Quality Management Division. The details of the study were compiled in accordance with the guidance, "Improving New Source Review Implementation," 1 December 1987, from J. Craig Potter, USEPA's Assistant Administrator for Air and Radiation, and the accompanying document "Best Available Control Technology Guidance Document, EPA Region 9, April 1987."

The following sections of the analysis present the "top-down" BACT analysis for each pollutant that exceeded the SER and is specific to each emission unit, unless otherwise specified. The five steps in such an evaluation can be summarized as follows:

Step 1. Identify all possible control technologies;
Step 2. Eliminate technically infeasible control options;
Step 3. Rank the technically feasible control technologies based upon emission reduction potential;
Step 4. Evaluate ranked control technologies based on energy, environmental, and/or economic considerations; and
Step 5. Select BACT.

The above process is typically conducted on a unit-by-unit, pollutant-by-pollutant basis. While the top-down BACT analysis is a procedural approach suggested by USEPA policy, this approach is not specifically mandated as a statutory requirement of the BACT determination. The BACT analysis has been evaluated via this "top-down" approach. The "top-down" will be further discussed below.

Economic considerations identified in Step 4 above were completed in accordance with Office of Air Quality Planning and Standard's Control Cost Manual. Supporting documentation for capital and installation costs utilized in the analyses is included in the appendices of this document.

5.4 Emission Units and Pollutants

As discussed above, BACT is required for any emission unit that emits a PSD-regulated pollutant above the respective significant emission rate (SER) with Table 5-1 identifying those regulated pollutants exceeding the SER as PM, PM_{10}, $PM_{2.5}$, VOCs, and CO.

[2] U.S. EPA Environmental Appeals Board decision, Newmont Nevada Energy Investment L.L.C. PSD Appeal No. 05-04, decided December 21, 2005. Environmental Administrative Decisions, Volume 12, Page 442.

Table 5-2 identifies each unit-that emits a PSD regulated pollutant. Because the emission rates for most PM, PM_{10} and $PM_{2.5}$-generating emission units are quantified at the stack level (see bottom of Table 5-2), Tables 2-2 and Table 2-3 provides a cross reference of Air Pollution Control Device (APCD) ID/Stack ID to Emission Unit ID and Emission Unit Name, respectively, allowing identification of all emission units subject to BACT due to their particulate emissions.

A summary of Emission Unit ID, Emission Unit Description and identification of pollutant emitted by each operation is provided in Table 5-3.

5.5 Analysis Introduction and Prioritization

The first step in conducting the analyses was to identify current emission reduction technologies and determine which operations would most likely be cost-effective to control. Therefore, a review of the RBLC was completed to identify similar operations, already in existence, using add-on controls for PM, PM_{10}, $PM_{2.5}$, VOC, and CO emissions.

The above review found several determinations for PM, PM_{10}, and $PM_{2.5}$ emission sources. Most of the determinations included the installation of a baghouse. As previously mentioned, no pouring, mold cooling, and shakeout operations were found in the RBLC using a CO and/or VOC emissions control device (excluding mold vent light-off). In addition, based on a review of the RBLC and several state permits, no PUCB core- making or mold-making operations were identified as utilizing VOC controls other than an acid scrubber for amine catalyst emissions control.

The review of the RBLC found only VOC emission control devices installed on melting (Electric Arc Furnaces (EAFs) and Cupolas). EAFs and cupolas are more significant sources of VOCs, when compared to an Electric Induction Furnace as installed and used at FWNA.

A major concern when evaluating the feasibility of emissions controls on pouring, mold cooling, and shakeout was the fact that to date no CO and/or VOC control devices were found installed on any of these operations. Given this fact and considering the potential generation of partially oxidized organic compounds and the potential formation of condensation, any control technologies must be carefully evaluated.

Also, from discussions with air pollution control device (APCD) vendors, in the event of a baghouse failure, a secondary filter system would be necessary to capture PM emissions prior to any "regenerative" VOC/CO control device. The most practical and economical of these systems would be a vessel with multiple filters, though some vendors recommended against using regenerative thermal oxidizer systems because of this potential problem. Vendors indicated that a recuperative system would more likely survive an occasional high PM loading but did indicate that such an event would not be desirable and would shorten the lifespan of the control equipment.

While the process requires a BACT determination for every emission unit, this analysis focused on those production scenarios that would have the largest emissions rates since it is less likely that operations with smaller emissions would be cost-effective to control. The operations and their respective estimated annual PM/PM_{10}/$PM_{2.5}$, VOC, and CO emissions are summarized in Table 5-2.

5.6 BACT Process and Foundry Specific Considerations

During preparation and subsequent evaluation of the BACT analysis, a number of considerations and concerns were identified including those discussed below:

5.6.1 RBLC Information Quality

Any critical BACT determining information identified in the RBLC must be verified before use. For example, Indiana Department of Environmental Management was contacted to clarify relatively low VOC emissions limits listed in the RBLC for the PUCB core-making operations identified at two facilities in Indiana. **From these discussions, it was learned that the VOC emissions limits are only intended to address binder system catalyst emissions.** VOC emissions from the resin and other potential organic materials used in the process were not addressed in the permit. FWNA has installed similar controls for the VOC emissions from the PUCB catalyst with control efficiency similar to the Indiana permit requirement.

Regarding PM, PM_{10} and $PM_{2.5}$ RBLC determinations, care must be exercised to investigate whether those emission rates include condensable portion and whether a test method that would measure condensable matter (e.g., USEPA Method 202) was specified in the permit.

Finally, it is important to determine whether compliance has been demonstrated with any particular emission limitation. **This concern actually manifested itself in the previous FWNA air permit application where a Waupaca RBLC VOC determination for a shakeout was used. While FWNA was found to not be in compliance with that emission rate, it has been determined that the Waupaca facility cannot meet that emission rate as well.**

5.6.2 RBLC Identified Pollutants and Emission Rates

It is apparent from review of the RBLC that CO and VOC emissions from pouring, mold cooling, and shakeout operations have been inconsistently identified in air permit applications including several facilities in the RBLC that did not identify any CO or VOC emissions from these operations. This reduces the number of RBLC determinations available for review.

It is important to recognize that a number of the VOC emission limitations identified for the above operations are the emission factor identified in WebFIRE as opposed to the resultant emission rate from a detailed BACT evaluation.

5.6.3 CO and VOC Emission Quantification and Variability

Another important project issue was determining representative VOC and CO emission factors for this analysis. VOC emission factors published in USEPA's AP-42 and WebFIRE for iron foundries are of "poor" or "unknown" quality. In the case of CO, no emission factors exist in AP-42 or WebFIRE for pouring, mold cooling, and shakeout operations. While FWNA has conducted testing, the dataset is limited.

Following along with the above, it is important to consider material and process variability when comparing CO emission from iron pouring and mold cooling operations. CO emissions may vary due to metal type, pouring temperature, raw materials, throughput rate, and other product or production parameters.

Therefore, it is very difficult to compare CO emissions from individual pouring and mold cooling operations on a pound per hour basis without an understanding of the underlying process. While not perfect, it is prudent to compare operations pouring the same metal (e.g., iron) with similar raw materials (such as mold binder type) in terms of pounds of emission per ton of iron poured. This would at least consider metal type (which gives a good indication of pouring temperature) and production rate.

5.6.4 Commingling of Process Emissions

For successful operation of a fabric filter, emissions from a single foundry operation are usually vented to multiple air pollution control devices. This ensures each fabric filter encounters particles whose size is more widely distributed and that any moist or particles with adhesive properties are not all vented to a single fabric filter The activities of commingling process emissions promote the development of a superior cake and assists with the release of the cake from the filtering media.

Therefore, when reviewing a single foundry RBLC determinations, it must be recognized that the entry is usually not from a single operation but for a commingled exhaust from multiple operations. This commingling not only impact RBLC determinations for particulates but any gaseous pollutant being evaluated.

5.6.5 Air Volume and Capture Rates

Because of the nature of foundry operations, emission unit ventilation requirements due to equipment configuration and access typically require high exhaust airflow rates with a portion of the emission remaining fugitive. The RBLC does not provide an assessment of the capture system or capture rate, which could alter the results of any BACT and the corresponding compliance demonstration.

5.7 Control Technology Feasibility

This section discusses in more detail the "top-down" BACT analysis that will be conducted for each pollutant that exceeded the SER. The five steps in such an evaluation can be summarized as follows:

- **Step 1.** Identify all possible control technologies;
- **Step 2.** Eliminate technically infeasible control options;
- **Step 3.** Rank the technically feasible control technologies based upon emission reduction potential;
- **Step 4.** Evaluate ranked control technologies based on energy, environmental, and/or economic considerations; and
- **Step 5.** Select BACT.

5.7.1 Step 1 – Identify All Control Technologies

The primary objective of Step 1 is to identify all "available" control options for the emission unit in question. Available control options are defined in the 1990 Draft NSR Workshop Manual as:

> … those air pollution control technologies or techniques with a practical potential for application to the emissions unit and the regulated pollutant under evaluation. Air pollution control technologies and techniques include the

> application of production process or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of the affected pollutant. This includes technologies employed outside of the United States. As discussed later, in some circumstances inherently lower-polluting processes are appropriate for consideration as available control alternatives. The control alternatives should include not only existing controls for the source category in question, but also (through technology transfer) controls applied to similar source categories and gas streams, and innovative control technologies. Technologies required under lowest achievable emission rate (LAER) determinations are available for BACT purposes and must also be included as control alternatives and usually represent the top alternative.

A lower-polluting process or practice is considered applicable if it has been demonstrated for a similar emission unit or application. An add-on control is considered applicable if it can properly function given the physical characteristics of the pollutant stream being controlled (i.e., gas stream temperature, pollutant concentration, etc.).

Potentially applicable control options were surveyed. These included control technologies that have been used in other source categories and countries. Control technologies identified by LAER determinations were also included as available control technologies.

Based on the guidelines provided in the USEPA Draft New Source Review Workshop Manual document, a comprehensive list of available control technologies was developed for this permit application.

5.7.2 Step 2 – Eliminate Technically Infeasible Options

The purpose of Step 2 is to evaluate the technical feasibility of the control technology options identified in Step 1. Control technologies that have been installed and operated successfully on the type of emission unit under review are considered demonstrated and technically feasible. Control technologies that are not applicable or not available are determined to be technically infeasible. For a technology that has not been demonstrated for a particular type of emission unit, the Draft New Source Review Workshop Manual provides the following guidance:

> Two key concepts are important in determining whether an undemonstrated technology is feasible: “availability” and “applicability.” As explained in more detail below, a technology is considered “available” if it can be obtained by the applicant through commercial channels or is otherwise available within the common sense meaning of the term. An available technology is “applicable” if it can reasonably be installed and operated on the source type under consideration. A technology that is available and applicable is technically feasible.

A control technique is considered available, within the context presented above, if it has reached the licensing and commercial sales stage of development. A source would not be required to experience extended time delays or resource penalties to allow research to be conducted on a new technique. Neither is it expected that an applicant would be required to experience extended trials to learn how to apply a technology on a new and dissimilar source type.

Consequently, technologies in the pilot scale testing stages of development would not be considered available for BACT review. An exception would be if the technology were proposed and permitted under the qualifications of an innovative control device consistent with the provisions of 40 CFR 52.21(v) or, where appropriate, the applicable SIP.

Commercial availability by itself, however, is not necessarily sufficient basis for concluding a technology to be applicable and therefore technically feasible. Technical feasibility, as determined in Step 2, also means a control option may reasonably be deployed on or "applicable" to the source type under consideration.

Technical judgment on the part of the applicant and the review authority is to be exercised in determining whether a control alternative is applicable to the source type under consideration. In general, a commercially available control option will be presumed applicable if it has been or is soon to be deployed (e.g., is specified in a permit) on the same or a similar source type. Absent a showing of this type, technical feasibility would be based on examination of the physical and chemical characteristics of the pollutant-bearing gas stream and comparison to the gas stream characteristics of the source types to which the technology had been applied previously.

Deployment of the control technology on an existing source with similar gas stream characteristics is generally sufficient basis for concluding technical feasibility barring a demonstration to the contrary.

5.7.3 Step 3 – Rank Remaining Technically Feasible Control Options

The third step in the five step top-down BACT evaluation process involves ranking of the technically feasible control options determined in Step 2 from most effective to least effective in terms of emissions reduction potential. Step 3 also determines the energy, economic, and environmental impacts associated with the technically feasible control options, which are more fully evaluated in Step 4 of the process.

Ranking control options involves the selection of appropriate units of emissions for comparison between types of control technologies and emission units.

Achievable emission limits were determined for each of the control technology options based on engineering estimates, published literature, and testing data from existing sources. After establishing performance levels for the technically feasible control technologies, control technology alternatives were ranked by their demonstrated emissions reduction performance. Also, as indicated in the Draft New Source Review Workshop Manual regarding selection of the defined "top" control technology alternative:

> … an applicant proposing the top control alternative need not provide cost and other detailed information in regard to other control options. In such cases the applicant should document that the control option chosen is, indeed, the top, and review for collateral environmental impacts.

5.7.4 Step 4 – Evaluate Remaining Control Technologies

Step 4 of the five step top-down BACT evaluation process involves evaluating the suitability of the ranked control technology options under Step 3, based on energy, economic, and environmental impacts of use of the control technology. The following excerpt, taken from the Draft New Source Review Workshop Manual, explains the general evaluation process of Step 4:

> "If the applicant accepts the top alternative in the listing as BACT, the applicant proceeds to consider whether impacts of unregulated air pollutants or impacts in other media would justify selection of an alternative control option. If there are no outstanding issues regarding collateral environmental impacts, the analysis is ended, and the results proposed as BACT. In the event that the top candidate is shown to be inappropriate, due to energy, environmental, or economic impacts, the rationale for this finding should be documented for the public record. Then the next most stringent alternative in the listing becomes the new control candidate and is similarly evaluated. This process continues until the technology under consideration cannot be eliminated by any source-specific environmental, energy, or economic impacts which demonstrate that alternative to be inappropriate as BACT."

The energy impacts analysis determines whether the use of the control technology results in any significant or unusual energy penalties or benefits. The economic impacts analysis evaluates average and incremental cost effectiveness to determine if use of the control technology would result in a negative economic impact. The evaluation of environmental impacts considers the site-specific environmental impacts of use of the control technology option, involving issues such as waste generation, water use and discharge, visibility impacts, emissions of additional pollutants, etc.

5.7.5 Step 5 – Selection of BACT

The highest ranked and most effective control option not eliminated in Step 4 for energy, economic, or environmental impacts is selected and proposed as BACT for that pollutant and emission unit.

These procedures were followed to develop a BACT assessment for each major piece of equipment in the process for each of the three PSD triggering pollutants. This analysis is presented in the following sections by pollutant.

Table 5-6, 5-12 and 5-21 provide a summary of the conclusion and basis for each BACT determination.

5.8 Particulate BACT

Almost all of the emission sources in the iron foundry process emit particulate matter in one form or another. The main source of the particulate is the sand used to form the mold. Particulate is also generated from the finishing and machining of the finished parts and the final coating application.

In the case of the machining, particulate is formed from the fine metal dust during grinding and milling operations. This particulate is generally in filterable form, but a

significant amount of condensable particulate can be generated from the pouring, cooling and shakeout operation and is a result of incomplete combustion of the organic compounds emitted from the mold in this step. Too much less of a degree condensable particulate is also generated from the combustion of natural gas in the melt shop and the utilities area.

As stated previously, information from the prior application will be retained as possible and especially for those emission units where emission increases are not requested.

5.8.1 Step 1 – Identify All Control Technologies

Available control technologies with the practical potential for application to the emission unit are identified in Step 1. The application of demonstrated control technologies in other similar source categories to the emission unit of concern can also be considered. While identified technologies may be eliminated in subsequent steps in the analysis based on technical and economic infeasibility or environmental, energy, economic or other impacts, control technologies with potential application to the emission unit under review are identified in this step.

Under Step 1 of the BACT analysis, the following resources are typically consulted when identifying potential control technologies or work practices:

- Applicable NESHAP, NSPS and State Rules
- U.S. EPA's RBLC database;
- Determinations of BACT by regulatory agencies for other similar sources or air permits and permit files from federal or state agencies;
- Federal and/or state regulatory requirements;
- Engineering experience with similar control applications;
- Information provided by air pollution control equipment vendors with significant market share in the industry; and
- Review of literature from industrial technical or trade organizations.

NESHAP Review

As stated in Section 4, FWNA is subject to the Foundry Area Source Rule and is defined by the rule as a "new" source and a "large" foundry. As such, FWNA is subject to the following PM requirements:

- Per 40 CFR §63.10895(c)(2) the facility must not discharge to the atmosphere emissions from any metal melting furnace or group of all metal melting furnaces that exceed 0.1 pounds of PM per ton of metal charged or 0.008 pounds of total metal HAP per ton of metal charged.
- Per 40 CFR §63.10895(e), the facility must not discharge to the atmosphere fugitive emissions from foundry operations that exhibit opacity greater than 20 percent (6-minute average), except for one 6-minute average per hour that does not exceed 30 percent.

RBLC Review

A review of the RBLC was conducted in November 2024. The review assessed permits from the time period of January 2006 through November 2024. Research of the historical and transient

databases was not conducted because the control determinations in those databases would precede the implementation of the major and area source National Emission Standards for Hazardous Air Pollutants (NESHAPs) for iron foundries and generally would not be as stringent on emission limits or control technology requirements.

Table 5-5 includes $PM/PM_{10}/PM_{2.5}$ determinations contained in the RBLC. The RBLC identified fabric filters/baghouses as the method of control for filterable particulate matter emissions. No control technology was identified for condensable particulate matter.

RBLC process numbers correspond to the following:

Cupola Furnace	81.410
Induction Furnace	81.420
Desulfurization	81.430
Sand, Core and Mold Making Process	81.440
Casting and Pouring Processes	81.450
Shakeout Processes	81.460
Other Iron Foundry Processes	81.490

For particulate matter from the coating operations, in addition to process number 81.490, the RBLC was reviewed for process number 41.013. This yielded the Fritz Winter North America Facility as the only facility to coat iron castings.

While the RBLC only identified fabric filters/baghouses for the emission units of concern, potential control technologies for filterable particulate matter include the following:

- Cyclones
- Wet scrubber
- Electrostatic precipitators (ESPs)
- Cartridge collectors
- Fabric Filters (Baghouses)

These technologies are discussed below.

<u>Cyclones</u>
A cyclone is a simple mechanical device that uses centrifugal and inertial forces on particulate laden exhaust within cylindrical container. Large particles hit the wall of the cyclone and fall to the bottom where they can be collected. Unless all the particles are of a large diameter (>10 microns) the cyclone is not considered the most efficient collection devices. Cyclones are typically used as a pre-cleaning control used to reduce the particulate concentration in a gas stream prior to entering a second more effective control device.

<u>Wet scrubber</u>
Wet scrubbers used for particulate are generally Venturi scrubbers. In Venturi scrubber particles are removed through inertial impaction when they impact upon water droplets traveling at a high velocity through the throat of the scrubber. Wet scrubbers are useful in removing particulates that are sticky and/or hygroscopic, combustive, corrosive and explosive, hard to remove in dry form, in presence of soluble gases, and have a high moisture content. Venturi

scrubbers and spray tower wet scrubbers are types of wet scrubbers generally employed in combustion of solid fuels.

Electrostatic Precipitators (ESPs)
Electrostatic precipitators utilize electrical forces to transfer particulate onto a collector plate. By passing flue gases laden with particulate through a gaseous ion region, known as a corona, particles are given a charge. The charged particles are forced onto the collector plate by an electrical field generated by electrodes kept at high voltage. In dry ESPs, the collected particles are knocked off into a hopper by a sonic horn or mechanically, in a manner that does not introduce them back into the gas stream. Wet ESPs remove PM buildup with intermittent or continuous washing with water.

Cartridge Collectors
Cartridge collector filters utilize paper or nonwoven fibrous media set in an inner and outer wire frame structure. The filter is often pleated to increase surface area. The exhaust is passed through the filter and as particulate is collected on its surface, efficiency increases.

Fabric Filters (Baghouses)
A fabric filter is one of the most efficient means of separating particles from a gas stream. The advantage of fabric filters is that the efficiency is largely insensitive to the physical characteristics of the gas stream and changes in the dust loading. Fabric filters are the industry standard for iron foundry particulate controls.

One type of fabric filter is the baghouse with both positive and negative pressure baghouses being used in the industry. Positive pressure baghouses operate at an internal pressure greater than atmospheric. In this configuration, the exhaust fans are located before the baghouse (i.e., on the “dirty side”) and pull the air from the process, then push the air through the baghouse. These systems may vent to ambient air through a continuous ridge vent instead of a stack.

Negative pressure baghouses operate at an internal pressure less than atmospheric. In this configuration, the exhaust fans are located after the baghouse (i.e., on the “clean side”), pull the air from the process through the baghouse, and exhaust to the ambient air through a central stack.

5.8.2 Step 2: – Eliminate Technically Infeasible Options

Below presents a discussion regarding the elimination of certain identified control technologies.

Cyclones
As mentioned earlier, cyclones are typically used as a pre-cleaning control and thus would have to be placed prior to the baghouse. As a pre-cleaner, cyclones are designed to remove more than 80% of particles greater than twenty microns in diameter. The majority of the particulate in the various foundry exhaust streams will be smaller than twenty microns and thus will not be an effective pre-control. Cyclones are a technically infeasible option and will not be analyzed further.

Wet Scrubbers

Wet scrubbers are technically feasible but have many disadvantages compared to fabric filters, which can achieve better levels of particulate control. Scrubber systems have very high pressure drops that result in unacceptable system operating costs. They also required water treatment and sludge disposal, which are not necessary with the other particulate control options.

Wet scrubbers were more commonly used in iron foundries to control exhaust from a cupola furnace. In that application a wet scrubber makes sense because in a cupola fuel is being burned in the furnace where the metal is melted. Typically, the fuel used is coal and since considerable amount of sulfur dioxide is released from such furnaces, the scrubber can remove that as well as particulate. Since FWNA will use an induction furnace that has negligible gaseous emissions and since sand and dust recovery is an essential part of the FWNA process, wet scrubbers are considered not technically feasible to the FWNA process and will not be further analyzed.

ESPs

ESPs are not technically feasible for the FWNA operation. A key parameter is the composition of the particles to be collected. Iron compounds adhere very strongly to the collection plate of the ESP (due to their electromagnetic properties). They are, therefore, very difficult to remove and thus reduce ESP efficiency. Zinc and other metal compounds tend to foul ESP electrodes, also reducing effectiveness. In addition, ESPs have a relatively high capital cost and are greatly affected by sensitivity to the variations in flow rate, solids loading, and temperature fluctuations inherent in batch operations like that seen in an iron foundry. For these reasons ESPs are considered technically infeasible and not considered further.

Cartridge Collectors

Cartridge collectors function optimally with a low loading of dry, non-sticky dust flowing at a low rate of 10,000 cubic feet per minute (cfm) or less and in low humidity. However, for the FWNA process typical air flow rates are in the range of approximately 100,000 dry standard cubic feet per minute (dsfcm). In addition, some of the sand and dust that would be collected on the cartridge may have residual resin material from the core bonding materials that would tend to obstruct the cartridge making it unusable. Due to these limitations, cartridge collectors are only viewed as technically feasible for the machining operations.

Fabric Filters (Baghouses)

Fabric filters and generally baghouses are the industry standard for iron foundries particulate controls and is considered further in the next step.

5.8.3 Step 3: – Ranking Remaining Control Technologies by Control Effectiveness

Now that the control technology has been selected the emission limit needs to be assessed based on this technology.

Using the current state of the art bags and overall design, most vendors will guarantee an outlet grain loading of 0.005 grains per dscf (gr/dscf) for filterable particulate emissions. EPA in developing the emission standards for new “area sources” of HAPs as discussed above established emission levels from melting operations of 0.1 lb/ton of metal. This level of control can only be met with certain baghouse designs.

5.8.4 Step 4: Evaluate Most Effective Controls and Document Results

Table 5-5 provides the PM, PM_{10} and $PM_{2.5}$ RBLC entries for all foundry operations from January 2006 through November 2024 and are sorted by process number.

Prior to 2016, typically the permitted level for all of the operations has been 0.005 gr/dscf. One foundry, Rochester Metal Products, Inc. was permitted at a lower level of 0.003 gr/dscf. We contacted the state agency (IDEM), and they confirmed Rochester Metal Products, Inc. was achieving those levels but for filterable PM only.

ASAMA foundry in Wheland, Georgia has a baghouse with an identified outlet loading of 0.001 gr/dscf. This baghouse only controls emissions from minor sources such as silo bin vents. At this same foundry, the permit levels for the main source of emissions is 0.005 gr/dscf and for one application, the shot blasting area is 0.008 gr/dscf.

Following 2016, there are newer installations with outlet loading limitations in the range of 0.001 to 0.003 gr/dscf, depending on expected contribution of condensable particulates. Baghouses with higher inlet loading from melting, pouring, cooling and shakeout have RBLC determinations on the higher side of this range. Operations with no expected condensable fraction (e.g., grinding, shotblasting) have RBLC determinations on the lower side of the range.

5.8.5 Step 5: Select BACT

BACT cannot be less stringent than the applicable NSPS, NESHAP or SIP limit. Since the FWNA foundry will be a minor source of HAPs the applicable NESHAP standard is Subpart ZZZZZ. This subpart limits the filterable particulate emissions from the melt shop baghouse to 0.1 lb/ton of metal.

Table 5-6 provides the BACT limit and justification for each emission unit.

5.9 CO BACT

In addition to the CO emission from the combustion of fuels (natural gas throughout a number of operations and diesel fuel used at the emergency generators), the main sources of CO from the FWNA are the melting, pouring, cooling and shakeout (PCS) operations.

At the PCS operations CO is generated during partial oxidation of the gases that leave the mold during the pouring operation. These gases contain various organic compounds created from the breakdown of binders in the core and the carbon in the green sand mold. This CO is first emitted at the pouring operation but continues during cooling and shakeout.

The majority of the CO emissions are released via the Core/Mold Baghouse stack (CU08/ST09) as a result of pouring and cooling. CO emissions are also generated during melting and released via the Melt Baghouse stack (CU01/ST02) and during shakeout with those being emitted via the Sand Plant Baghouse (CU06/ST07) stack.

This BACT analysis leaves the original text that examines potential add-on controls to reduce the CO that is generated from pouring, cooling and shakeout but adds an analysis to determine BACT from the electric induction furnaces.

5.9.1 Step 1 – Identify All Control Technologies

Available control technologies with the practical potential for application to the emission unit are identified in Step 1. The application of demonstrated control technologies in other similar source categories to the emission unit of concern can also be considered. While identified technologies may be eliminated in subsequent steps in the analysis based on technical and economic infeasibility or environmental, energy, economic or other impacts, control technologies with potential application to the emission unit under review are identified in this step.

Under Step 1 of the BACT analysis, the following resources are typically consulted when identifying potential control technologies or work practices:

- Applicable NESHAP, NSPS and State Rules
- U.S. EPA's RBLC database;
- Determinations of BACT by regulatory agencies for other similar sources or air permits and permit files from federal or state agencies;
- Federal and/or state regulatory requirements;
- Engineering experience with similar control applications;
- Information provided by air pollution control equipment vendors with significant market share in the industry; and
- Review of literature from industrial technical or trade organizations.

NESHAP Review

As stated in Section 4, FWNA is subject to the Foundry Area Source Rule and is defined by the rule as a "new" source and a "large" foundry. As such, FWNA is subject to the following PM requirements:

- Per 40 CFR §63.10895(c)(2) the facility must not discharge to the atmosphere emissions from any metal melting furnace or group of all metal melting furnaces that exceed 0.1 pounds of PM per ton of metal charged or 0.008 pounds of total metal HAP per ton of metal charged.
- Per 40 CFR §63.10895(e), the facility must not discharge to the atmosphere fugitive emissions from foundry operations that exhibit opacity greater than 20 percent (6-minute average), except for one 6-minute average per hour that does not exceed 30 percent.

RBLC Review

A review of the RBLC was conducted in November 2024. The review assessed permits from the time period of January 2006 through November 2024. Research of the historical and transient databases was not conducted because the control determinations in those databases would precede the implementation of the major and area source National Emission Standards for Hazardous Air Pollutants (NESHAPs) for iron foundries and generally would not be as stringent on emission limits or control technology requirements.

Table 5-8 includes CO determinations contained in the RBLC. The RBLC identified "mold vent off gas ignition" as the method of control for carbon monoxide emissions.

The data in Table 5-8 is sorted by process number. RBLC process numbers correspond to the following:

Cupola Furnace	81.410
Induction Furnace	81.420
Desulfurization	81.430
Sand, Core and Mold Making Process	81.440
Casting and Pouring Processes	81.450
Shakeout Processes	81.460
Other Iron Foundry Processes	81.490

Potential control technologies include the following:

1. Incineration
2. Flare
3. Mold vent gas autoignition

Incineration

Incineration equipment increases the temperature of exhaust gas stream to the combustion temperature of CO. There are three types of incineration systems: recuperative, regenerative, and catalytic. In a recuperative thermal oxidizer, the exhaust enters a combustion chamber and into a heat exchanger. The heat exchanger utilizes conduction to transfer heat to the waste gas. The exhaust gas can be used to preheat incoming waste gas and/or combustion air to offer fuel savings. A regenerative thermal oxidizer (RTO) uses a direct contact heat exchanger to raise the exhaust temperature.

The heat exchanger is made up of a structured, high heat capacity media like a bed of porous ceramic packing. A regenerative catalytic oxidizer (RCO) is very similar to an RTO but uses a precious metal-based catalyst bed and the oxygen in the gas stream to reduce CO emissions to carbon dioxide (CO2). The catalyst speeds up the conversion of CO at a lower temperature than a thermal incinerator.

Flare

Flares utilizes the fuel value of the exhaust streams themselves and if present in high enough concentrations (CO or VOC), the gas can be burned at the flare tip with some type of ignition source typically at a well elevated level. The gas is burned without heat recovery and directly vented into the atmosphere.

Mold Vent Off Gas Autoignition

When the molten iron is poured onto the sand molds, organic HAP and CO are emitted when the chemicals in the mold and core vaporize or undergo pyrolysis. Emission of HAPs and CO continue to be emitted during cooling and shakeout process. These gases are concentrated into one or two vents built into the mold for the sole purpose of venting the gases generated when molten metal is poured into it. The mold off gas vents for the most part occurs almost immediately after pouring begins due to the heat caused by the molten metal.

5.9.2 Step 2: Eliminate Technically Infeasible Options

Below presents a discussion regarding the elimination of certain identified control technologies.

Incineration

In the FWNA process, an add-on incinerator could only follow a baghouse due to high particulate content in the exhaust streams. Regenerative and catalytic systems can be rendered inoperable if the particulate residuals in the exhaust stream foul the catalyst bed or ceramic media packing of the RTO. Even so placing an RCO downstream of a baghouse still may not protect the unit. Catalyst vendors state that certain compounds might poison a catalyst by reacting with the active sites on the catalyst to render it inactive. Typical elements that need to be considered are sulfur, phosphorus, silicon, and heavy metals. The latter two pollutants will be present in the exhaust. Vendors warn that even small concentrations of these elements can render a catalyst ineffective. The gas stream must be carefully characterized to make sure that poisons do not exist.

In particular vendors caution that particulate matter can mask or even poison a catalyst to render it ineffective. However, the size and physical state of the particles must be carefully considered; particles in the gas stream do not necessarily mean that RCO cannot be used. For example, coarse particles will be caught in the media bed and will not reach the catalyst layer on top. Likewise, condensable particles will re-volatilize by the time they reach the catalyst. Neither case would prevent catalyst operation.

However, fine particulate might reach and deposit on the catalyst layer. Such fine particulate will be present in these exhaust streams.

Flare

As indicated, flares utilize continuous and highly concentrated CO and VOC streams. This would be technically infeasible for the PCS stream because it exhibits a low concentration of CO (<130 ppm) and a low VOC concentration. Utilizing a flare to control CO emissions is not technically feasible and will not be further analyzed.

Mold Vent Off Gas Autoignition

The MACT rule states that mold vent autoignition is occurring if a flame ignites more than 75% of the time during the pouring operation. It is FWNA's experience that this occurs more than 75% of the time in their process but to enhance the probability of auto-ignition, gas burner(s) will be situated along the conveyor downstream of the pouring station that will be oriented to ignite the vents on the mold assemblies in case they are not already burning. capture rate, which could alter the results of any BACT and the corresponding compliance demonstration.

5.9.3 Step 3: Ranking Remaining Control Technologies by Control Effectiveness

Mold vent off gas autoignition and incineration are the only technically feasible methods for CO control of PCS emissions. There is a major concern about operation of an RCO due to the possibility that the particulate and metals in the gas stream, in particular the silica particles will poison the catalyst. Regardless, an RCO is further evaluated for its cost effectiveness.

5.9.4 Step 4: Evaluate Most Effective Controls and Document Results

Please find the below discussion regarding the effective CO control technology by operation.

Electric Induction Furnaces
To evaluate the economic feasibility of installing an RCO or RTO downstream of the Melt Baghouse (CU01/ST02), the 2024 EPA cost estimating spreadsheets for an RCO and RTO were used to estimate the annualized costs. These cost spreadsheets estimate the equipment and operating costs for an oxidizer based on the exhaust flow rate from the processes and installing the necessary duct work to route the gases from the baghouse to the RCO/RTO.

Table 5-9 provides a summary of the cost effectiveness in controlling the CO emissions in this manner. Between the two different oxidizers the cost to control emissions from the Melt Baghouse (CU01/ST02) is estimated to be in the range of $42,000 to $82,000 per ton of pollutant controlled. As VOC could also be controlled by these technologies the cost effectiveness of controlling both emissions were evaluated and determined to be in the range of $37,000 to $71,000 per ton of pollutant controlled. Support for this evaluation is included in Appendix H.

Pouring, Cooling and Shakeout
To evaluate the economic feasibility of installing an RCO or RTO downstream of the Sand Plant Baghouse (CU06/ST07) and Core/Mold Baghouse (CU08/ST09) that control particulate emissions from pouring, cooling and shakeout, the 2024 EPA cost estimating spreadsheets for an RCO and RTO were used to estimate the annualized cost. These cost spreadsheets estimate the equipment and operating costs for an oxidizer based on the exhaust flow rate from the processes and installing the necessary duct work to route the gases from each baghouse to the RCO/RTO.

Table 5-10 and Table 5-11 provides a summary of the cost effectiveness in controlling the CO emissions in this manner.

Between the two different oxidizers the cost to control emissions from the Sand Plant Baghouse (CU06/ST07) is estimated to be in the range of $89,000 to $171,000 per ton of pollutant controlled. As VOC could also be controlled by these technologies the cost effectiveness of controlling both emissions were evaluated and determined to be in the range of $40,000 to $78,000 per ton of pollutant controlled. Support for this evaluation is included in Appendix I.

Between the two different oxidizers the cost to control emissions from the Core/Mold Baghouse (CU08/ST09) is estimated to be in the range of $8,000 to $16,000 per ton of pollutant controlled. As VOC could also be controlled by these technologies the cost effectiveness of controlling both emissions were evaluated and determined to be in the range of $5,100 to $10,000 per ton of pollutant controlled. Support for this evaluation is included in Appendix J.

5.9.5 Step 5: Select BACT

Table 5-8 lists the CO emission limits and controls that are currently in place for PCS operations in similar iron foundries which were taken from US EPA RACT/BACT/LAER Clearinghouse (RBLC) database as well as from a search of facility permits of other iron foundries producing similar products that the FWNA foundry will. Emission limits for CO from these operations tend to be consistent and range from 6 lb/ton to 10 lb/ton of molten metal poured. In most cases the shakeout emissions are separated out from the pouring and cooling emissions in order to

properly recover the sand. That is why the listing may show 1 lb/ton for shake out and 5 lb/ton for pouring and cooling, but the sum total of the PCS emissions is 6 lb/ton.

Table 5-12 provides the BACT limit and justification for each emission unit.

5.10 VOC BACT

As discussed in Section 1 and identified in Table 1-14, this permit application includes an increase in VOC emissions over the previous permit application. As shown in Table 1-14 this increase is attributed to the VOCs generated from the mixing of the two-part phenolic urethane resin with the sand prior to core-making as well as use of the core release agent. These emissions would be generated from the Acid Scrubber and associated stack (CU08/ST09). Additional VOC emissions from pouring and cooling would also be vented to CU08/ST09.

The increase in VOC emission is also attributed to the Sand Plant Baghouse (CU06/ST07) due to an increase in VOC from Shakeout (EU53). The previous BACT determination was based on an entry from Waupaca Foundry of 0.1 lb/ton. Waupaca Foundry has not been able to comply with this emission rate. As stated in Section 1, because of the production variables, it is technically more prudent to view PCS emissions in total rather than to attempt to identify VOC emissions from pouring, cooling and shakeout discretely.

To a lesser extent, an increase in VOC emissions above the previous application is identified for the Melt Baghouse (CU01) stack, ST01. Initially only VOCs from combustion were estimated. Performance testing indicates approximately ten (10) tons per year are being emitted from the melting operation.

In addition to the above and VOC emissions from the combustion of natural gas and diesel fuel from three emergency generators (EU72-EU74), VOC emissions occur from the following operations:

- In addition to shakeout, VOC emissions are released from the pouring and cooling due to the same reason that CO emissions exist, that is due to incomplete combustion of gases emitted from the mold during pouring, cooling, and shakeout process. These emissions are released via the Sand Plant Baghouse (CU06/ST07) and the Core/Mold Baghouse (CU08/ST09).
- VOC emission also occur at the finishing operation where the final parts are coated with zinc containing paint. This paint contains some VOC which is emitted from Paint Line #1 Booth Filter (CU17/ST16), Paint Line #2 Booth Filter (CU15/ST15B), and Paint Line #3 Booth Filter (CU14/ST15A).
- As stated above, there is also VOCs emitted from the core shop where the phenolic urethane resin is mixed with the sand and unreacted amine gas is exhausted through the sulfuric acid scrubber (CU07/ST08).
- Minor amounts of VOC emissions from the Core Wash Stations #1 and #2 (EU43, EU79) amount to approximately 0.27 tpy.
- Limited emissions of VOC occur related to the Rust Prohibitive Application (EU82) is the range of approximately 1.0 tpy.

The sources of VOC emissions in this application are identified in Table 5-13.

5.10.1 Foundry Operations

The following section assesses BACT for the typical foundry operations.

5.10.1.1 Step 1 – Identify All Control Technologies – Foundry Operations

Available control technologies with the practical potential for application to the emission unit are identified in Step 1. The application of demonstrated control technologies in other similar source categories to the emission unit of concern can also be considered. While identified technologies may be eliminated in subsequent steps in the analysis based on technical and economic infeasibility or environmental, energy, economic or other impacts, control technologies with potential application to the emission unit under review are identified in this step.

Under Step 1 of the BACT analysis, the following resources are typically consulted when identifying potential control technologies or work practices:

- Applicable NESHAP, NSPS and State Rules
- U.S. EPA's RBLC database;
- Determinations of BACT by regulatory agencies for other similar sources or air permits and permit files from federal or state agencies;
- Federal and/or state regulatory requirements;
- Engineering experience with similar control applications;
- Information provided by air pollution control equipment vendors with significant market share in the industry; and
- Review of literature from industrial technical or trade organizations.

NESHAP Review

As stated in Section 4, FWNA is subject to the Foundry Area Source Rule and is defined by the rule as a "new" source and a "large" foundry. As such, FWNA is subject to the no organic HAP/VOC requirements associated with the Foundry Area Source Rule other than the metallic scrap management program. Per 40 CFR §63.10885(a) the facility must operate by purchasing only metallic scrap that does not include "post-consumer automotive body scrap, postconsumer engine blocks, post-consumer oil filters, oily turnings, lead components, chlorinated plastics, or free liquids."

As an alternative to the above, the facility can operate according to written material specifications for the purchase and use of only iron and steel scrap that has been depleted (to the extent practicable) of organics and HAP metals in the charge materials used by the iron and steel foundry.

RBLC Review

A review of the RBLC was conducted in September 2021. The review assessed permits from the time period of January 2006 through November 2024. Table 5-14 includes VOC determinations contained in the RBLC.

The RBLC database included entries for melting, pouring, cooling, shakeout, coremaking and miscellaneous operations. Findings of the RBLC included the following:

- For electric induction melting operations, no add on controls were found.
- For pouring/mold cooling operations, no add on control devices were identified. Mold vent ignition was the only work practice standard identified.
- For shakeout operations, no add-on control devices were found. As discussed elsewhere in this document, compliance has not been demonstrated for RBLC entries with emission limits of 0.1 lb/ton.
- For PUCB core machines, acid scrubber for the control of catalyst emissions was identified in the RBLC along with an amine control efficiency of 88.9%.

Other VOC control devices are discussed below.

Other Air Pollution Control Alternatives

Control devices reduce VOC emissions by either recovering or destroying VOCs before they are discharged into the ambient air. Incineration, flares, and mold vent off gas ignition are all viable control technologies to reduce VOC emissions; however, they have been deemed technologically infeasible for the sand plant. The following additional methods can help to reduce VOC:

- Absorption
- Adsorption
- Condensation
- Incineration
- Biodegradation
- Good work practices

Absorption

Process gases are dissolved in a non-volatile liquid usually by contact in a scrubber which ensures a high surface area of contact between the gas and absorbing liquid (water or some other absorptive liquid in which the gases are soluble).

Adsorption

In adsorption, exhaust gases are routed across a matrix of adsorption solid media such as carbon. The carbon beds can be regenerated and the VOC-laden stream from regeneration reused, disposed of as waste, or incinerated.

Condensation

The exhaust gases are routed across a heat exchanger to drop the temperature of the gases to a value where it will condense out the VOC for collection and reuse or disposal.

Incineration

Incineration equipment increases the temperature of exhaust gas stream to the combustion temperature of VOC. There are three types of incineration systems: recuperative, regenerative, or catalytic. In a recuperative thermal oxidizer, the exhaust enters a combustion chamber and into a heat exchanger. The heat exchanger utilizes conduction to transfer heat to the waste gas through conduction. The exhaust gas can be used to preheat incoming waste gas and/or combustion air to offer fuel savings. A regenerative thermal oxidizer uses a direct contact heat exchanger to raise the exhaust

temperature. The heat exchanger is made up of a structured, high heat capacity media like a bed of porous ceramic packing. A catalytic oxidizer uses a precious metal-based catalyst bed and the oxygen in the gas stream to reduce combust the VOC emissions to CO2. The catalyst allows the combustion to occur at a lower temperature than it otherwise would have in a thermal incinerator.

Biofiltration

In biofiltration, exhaust gases are passed over a filter composed of biologically active material to destroy VOCs.

Good Work Practices

As identified in the RBLC the auto-ignition of mold vent gases is one work practice to reduce VOC emissions as well as the metallic scrap management requirements identified above.

5.10.1.2 Step 2: Eliminate Technically Infeasible Options

The following evaluates the technical feasibility of controlling emissions from foundry operations using the technologies identified above.

Absorption

Because of the complexity of the organic exhaust stream this option was determined to be infeasible for pouring, cooling and shakeout. An acid scrubber will be assumed for use as a means of reducing the amine gas catalyst from the phenolic urethane coremaking operation

Adsorption

Adsorption columns were determined to be technically infeasible methods of control as they typically operate at pollutant loading concentrations of 500 to 2000 ppm and flow rates on the magnitude of 5000 cfm. The high flow rates and low concentrations of this scenario would not allow the VOCs to be effectively adsorbed.

Condensers

Refrigerated condensers were also reviewed as a possible control technology for this scenario. There is no record of a system of this type ever being used in a foundry. Condensers require much greater pollutant loading concentrations than will occur at any typical foundry operations. Concentrations as high as 500 ppm will have removal efficiencies of less than 50%. Per these restrictions, a condenser would not be technically feasible.

Incineration

In the FWNA process, an add-on incinerator could only follow a baghouse due to high particulate content in the exhaust streams. Regenerative and catalytic systems can be rendered inoperable if the particulate residuals in the exhaust stream foul the catalyst bed of ceramic media packing of the RTO.

Even so placing an RCO downstream of a baghouse still may not protect the unit. Catalyst vendors state that certain compounds might poison a catalyst by reacting with the active sites on the catalyst to render it inactive. Typical elements that need to be considered are sulfur, phosphorus, silicon, and heavy metals. The latter two pollutants will be present in the exhaust. Vendors warn that even small concentrations of these elements can render a catalyst ineffective. The gas stream must be carefully characterized to make sure that poisons do not exist.

In particular vendors caution that particulate matter can mask or even poison a catalyst to render it ineffective. However, the size and physical state of the particles must be carefully considered; particles in the gas stream do not necessarily mean that RCO cannot be used. For example, coarse particles will be caught in the media bed and will not reach the catalyst layer on top. Likewise, condensable particles will re-volatilize by the time they reach the catalyst. Neither case would prevent catalyst operation.

However, fine particulate might reach and deposit on the catalyst layer. Such fine particulate will be present in the exhaust of these two streams.

Recuperative thermal oxidizers were reviewed to determine the technical feasibility of this control technology. The typical air flow rate for this type of control technology is from 500 to 50,000 standard cubic feet per minute (scfm). The air flow rates are well above the maximum of the typical range. The pollutant loading (concentration) for this technology should be approximately 1500 to 3000 ppmv to maintain appropriate temperatures required. This installation is well below these concentrations regardless of the emissions unit described. Due to these considerations described in USEPA's Air Pollution Control Technology Fact Sheet, recuperative thermal oxidizers were considered infeasible.

Flare

As indicated, flares utilize continuous and highly concentrated CO and VOC streams. This would be technically infeasible because of the low concentrations of CO and VOC in each exhaust.

Mold Vent Off Gas Autoignition

The MACT rule states that mold vent autoignition is occurring if a flame ignites more than 75% of the time during the pouring operation. It is FWNA's experience that this occurs more than 75% of the time in their process but to enhance the probability of auto-ignition, gas burner(s) will be situated along the conveyor downstream of the pouring station that will be oriented to ignite the vents on the mold assemblies in case they are not already burning. capture rate, which could alter the results of any BACT and the corresponding compliance demonstration.

5.10.1.3 Step 3: Ranking Remaining Control Technologies by Control Effectiveness

For melting, pouring, cooling and shakeout, provided the air volumes and concentrations, incineration would be the only control technology that would likely be feasible.

Regarding coremaking, the cores are produced in an enclosed automated press machine. The machine takes the properly weighed out core sand and mixes it with the appropriate amount of a two-part phenolic urethane resin and hardener. The care making process is referred to as the cold box method which involves passing the sand/binder core through an amine (typically dimethyl propylamine) gas which is a catalyst that quickly hardens the resin. The resins have a very low vapor pressure and the emissions from the core machine are primarily unreacted amine. The industry standard control device for this operation is a sulfuric acid scrubber, specifically designed to reduce the amine gas concentration for odor concerns.

5.10.1.4 Step 4: Evaluate Most Effective Controls and Document Results

This assessment is identical for one made for CO in the sections above. Tables 5-15 through 5-17 proved the cost effectiveness. In all cases, neither the RTO nor RCO control technology is cost effective. Due to the high particulate loading in the exhaust of these streams the potential control technologies other than incineration are not technically feasible.

Electric Induction Furnaces

To evaluate the economic feasibility of installing an RCO or RTO downstream of the Melt Baghouse (CU01/ST02), the 2024 EPA cost estimating spreadsheets for an RCO and RTO were used to estimate the annualized costs. These cost spreadsheets estimate the equipment and operating costs for an oxidizer based on the exhaust flow rate from the processes and installing the necessary duct work to route the gases from the baghouse to the RCO/RTO.

Table 5-15 provides a summary of the cost effectiveness in controlling the VOC emissions in this manner. Between the two different oxidizers the cost to control emissions from the Melt Baghouse (CU01/ST02) is estimated to be in the range of $277,000 to $527,972 per ton of pollutant controlled. As CO could also be controlled by these technologies the cost effectiveness of controlling both emissions were evaluated and determined to be in the range of $37,000 to $71,000 per ton of pollutant controlled. Support for this evaluation is included in Appendix K.

Pouring, Cooling and Shakeout

To evaluate the economic feasibility of installing an RCO or RTO downstream of the Sand Plant Baghouse (CU06/ST07) and Core/Mold Baghouse (CU08/ST09) that control particulate emissions from pouring, cooling and shakeout, the 2024 EPA cost estimating spreadsheets for an RCO and RTO were used to estimate the annualized cost. These cost spreadsheets estimate the equipment and operating costs for an oxidizer based on the exhaust flow rate from the processes and installing the necessary duct work to route the gases from each baghouse to the RCO/RTO.

Table 5-16 and Table 5-17 provides a summary of the cost effectiveness in controlling the VOC emissions in this manner.

Between the two different oxidizers the cost to control emissions from the Sand Plant Baghouse (CU06/ST07) is estimated to be in the range of $75,000 to $144,000 per ton of pollutant controlled. As VOC could also be controlled by these technologies the cost effectiveness of controlling both emissions were evaluated and determined to be in the range of $41,000 to $79,000 per ton of pollutant controlled. Support for this evaluation is included in Appendix L.

Between the two different oxidizers the cost to control emissions from the Core/Mold Baghouse (CU08/ST09) is estimated to be in the range of $14,000 to $27,000 per ton of pollutant controlled. As VOC could also be controlled by these technologies the cost effectiveness of controlling both emissions were evaluated and determined to be in the range of $5,100 to $10,000 per ton of pollutant controlled. Support for this evaluation is included in Appendix M.

Coremaking
To evaluate the economic feasibility of installing an RCO, regenerative thermal oxidizer or recuperative thermal oxidizer in place of or downstream of the Acid Scrubber (CU07/ST08), the 2024 EPA cost estimating spreadsheets were used to estimate the annualized costs. These cost spreadsheets estimate the equipment and operating costs for an oxidizer based on the exhaust flow rate from the processes and installing the necessary duct work to route the gases to the oxidizer.

Table 5-18 provides a summary of the cost effectiveness in controlling the VOC emissions in this manner. Between the three different oxidizers the cost to control emissions in place of or downstream of the Acid Scrubber (CU07/ST08) is estimated to be in the range of $20,000 to $38,000 per ton of pollutant controlled. Support for this evaluation is included in Appendix N.

5.10.1.5 Step 5: Selection of BACT

Table 5-14 provides BACT and permit listings for VOC from PCS operations at iron foundries similar to the FWNA foundry. For all three operations FWNA proposes a work practice for control of VOC from the PCS process by practicing and ensuring mold vent autoignition.

A work practice for the core shop is to maintain the pH of the sulfuric acid scrubber below a pH of 4.5 to ensure that amine is absorbed. As well as keeping any unused resin containers closed.

5.10.2 Coating Operations

FWNA has determined that it will not install a fourth paint line. Please refer to Appendix D for the emission calculations and Appendix G for the Safety Data Sheets (SDSs). As a result of the elimination of the fourth paint line with this application FWNA requests Alternative Operating Scenario #1 be identified within the Air Permit as the representative operating scenario.

Following the submission of the original air permit application and subsequent to the initial air permit application revision, FWNA and their contractors addressed a number of concerns regarding the appropriate BACT for the control of VOC emissions from the coating operations. This application incorporates that work.

5.10.2.1 Step 1 – Identify All Control Technologies

The finished product is coated with zinc particles applied in a spray coating operation using zinc containing paints. The potential VOC emissions from the three paint lines (EU68, EU69 and EU71) is 29.2 tpy.

Available control technologies with the practical potential for application to the emission unit are identified in Step 1. The application of demonstrated control technologies in other similar source categories to the emission unit of concern can also be considered. While identified technologies may be eliminated in subsequent steps in the analysis based on technical and economic infeasibility or environmental, energy, economic or other impacts, control technologies with potential application to the emission unit under review are identified in this step.

Under Step 1 of the BACT analysis, the following resources are typically consulted when identifying potential control technologies or work practices:

- Applicable NESHAP, NSPS and State Rules
- U.S. EPA's RBLC database;
- Determinations of BACT by regulatory agencies for other similar sources or air permits and permit files from federal or state agencies;
- Federal and/or state regulatory requirements;
- Engineering experience with similar control applications;
- Information provided by air pollution control equipment vendors with significant market share in the industry; and
- Review of literature from industrial technical or trade organizations.

NESHAP Review

As stated in Section 4, FWNA is an "area source" of hazardous air pollutants (HAPs) subject to the Foundry Area Source Rule as well as possible application of the Surface Coating Area Source Rule. Neither rule identify any rule applicability to FWNA operations.

RBLC Review

A review of the RBLC was conducted in November 2024. The review assessed permits from the time period of January 2006 through August 2024. The only VOC determination for the coating of iron castings contained in the RBLC was for the operation of FWNA.

Other VOC control devices are discussed below.

Other Air Pollution Control Alternatives

Control devices reduce VOC emissions by either recovering or destroying VOCs before they are discharged into the ambient air. Incineration, flares, and mold vent off gas ignition are all viable control technologies to reduce VOC emissions; however, they have been deemed technologically infeasible for the sand plant. The following additional methods can help to reduce VOC:

- Absorption
- Adsorption
- Condensation
- Incineration
- Biofiltration
- Good work practices

Absorption

Process gases are dissolved in a non-volatile liquid usually by contact in a scrubber which ensures a high surface area of contact between the gas and absorbing liquid (water or some other absorptive liquid in which the gases are soluble).

Adsorption

In adsorption, exhaust gases are routed across a matrix of adsorption solid media such as carbon. The carbon beds can be regenerated and the VOC-laden stream from regeneration reused, disposed of as waste, or incinerated.

Condensation

The exhaust gases are routed across a heat exchanger to drop the temperature of the gases to a value where it will condense out the VOC for collection and reuse or disposal.

Incineration

Incineration equipment increases the temperature of exhaust gas stream to the combustion temperature of VOC. There are three types of incineration systems: recuperative, regenerative, or catalytic. In a recuperative thermal oxidizer, the exhaust enters a combustion chamber and into a heat exchanger. The heat exchanger utilizes conduction to transfer heat to the waste gas through conduction. The exhaust gas can be used to preheat incoming waste gas and/or combustion air to offer fuel savings. A regenerative thermal oxidizer uses a direct contact heat exchanger to raise the exhaust temperature. The heat exchanger is made up of a structured, high heat capacity media like a bed of porous ceramic packing. A catalytic oxidizer uses a precious metal-based catalyst bed and the oxygen in the gas stream to reduce combust the VOC emissions to CO_2. The catalyst allows the combustion to occur at a lower temperature than it otherwise would have in a thermal incinerator.

Biofiltration

In biodegradation, exhaust gases are passed over a filter composed of biologically active material to destroy VOCs.

Good Work Practices

Possible work practices for coating operations includes the use of low VOC coatings and retaining VOC-containing coatings in closed containers when not in use.

5.10.2.2 Step 2: Eliminate Technically Infeasible Options

The following evaluates the technical feasibility of controlling emissions from foundry operations using the technologies identified above.

Absorption

This control method and associated technologies are considered infeasible because the VOC from the coating operation is not water soluble.

Adsorption

Adsorption is technically feasible for painting operations but typically adsorption is chosen as a viable control technique only when particulate in the exhaust stream being treated is minimal such as printing operations where only volatile vapors exist. Carbon adsorption has been used in the past for painting operations in the automotive industry where exhaust air flows are relatively small, and the VOC content is not large enough to warrant direct oxidation.

Following submittal of the original permit application but prior to the initial permit revision, Fritz Winter has contacted numerous vendors of pollution control devices to obtain quotes for installation of a carbon adsorption/ regeneration system. VOC air pollution control device vendors contacted did not offer onsite regeneration units or stated the relatively small amount of VOC emissions did not warrant a carbon regeneration system especially considering the absence of on-site process reuse or recovery.

Vendors encouraged the consideration of more cost-effective control technologies. The vendors stated that onsite regeneration of activated carbon is viable only when the quantities of VOC are much greater and when the recoverable material is intended for reuse in the process. Regardless, adsorption remains a technically feasible control option for the air permit application.

Condensation

Condensation will not be an effective control method because VOC concentrations from the paint booth would be too diluted to be condensed.

Biofiltration

Like adsorption, a biofilter will generate a solid waste requiring disposal and likely not be cost effective when compared to incineration/oxidation. It will be retained as a feasible alternative for evaluation.

Incineration

Incineration remains a technically feasible control option for this operation.

Good Work Practices

In order many operations especially where solvents are used or in coating operations the VOC containing materials can be managed properly to minimize evaporation from storage or if possible, obtain substitute low VOC containing materials.

5.10.2.3 Step 3: Ranking Remaining Control Technologies by Control Effectiveness

The remaining control technologies are ranked in the following order with regard to likely control effectiveness:

1. Incineration/Oxidation
2. Carbon Adsorption
3. Biofiltration
4. Good Work Practices

5.10.2.4 Step 4: Evaluate Most Effective Controls and Document Results

A cost effectiveness evaluation was made for the addition of an RTO, biofilter, and activated carbon adsorber in the previous application. Table 5-19 provides the results of that analysis for Phase 1 (as the fourth paint booth will not be installed). Cost effectiveness ranges from $23,000 to $48,000 per ton of VOC removed. Appendix O provides the text from the previous application along with the supporting documents.

Evaluation of the traditional EPA BACT cost effectiveness calculation spreadsheet for a carbon adsorption system with actual vendor quotes, indicated that the cost of a carbon adsorption system is higher than the EPA spreadsheet used for the original permit application would indicate. Evaluation of the traditional EPA BACT cost effectiveness calculation spreadsheet for an RTO with actual vendor quotes indicated that the cost of an RTO is lower than the EPA spreadsheets appear to indicate. The lowest cost of the two vendor quotes was then inserted into the cost effectiveness calculations and the new cost-effective results that are summarized in Table 5-19 and supported by Appendix O.

While the FWNA permit was the only application identified in the RBLC, during the 2017 air permit application revision, for BACT comparison purposes Fritz Winter reviewed permits from similar facilities that practiced surface coating of iron cast parts and identified three foundries. Their permits are provided in Appendix P, and the limits are summarized in Table 5-20. Neither of the three issued air permits require any kind of VOC treatment of emissions.

5.10.2.5 Step 5: Selection of BACT

The proposed BACT for the coating operation is good work practices by keeping unused paint and solvent containers covered at all times.

5.11 BACT for Utility Operations

Natural gas burners will be utilized in several places around the foundry. At the pouring stations they are used to ensure even heat of the refractory spout during the pouring operation, and at the refractory relining area where new ladles are being fabricated or old ladles are repaired with new refractory lining. New refractory linings must be heat treated and that is done using an open flame natural gas burner. Whenever natural gas is burned in the foundry it will be by open flame which ensures good combustion which minimizes both CO and VOC emissions. Since natural gas is used and not some other fossil fuel the amount of particulate being generated is also minimized.

BACT for natural gas burning is a work practice of burning it in an open flame following vendor recommendations to ensure complete combustion. The amount of particulate, CO and VOC generated from this combustion operation is assumed to be equal to or less than emissions listed in Section 1.4 of AP-42 for natural gas burning in boilers.

The FWNA foundry will have three diesel fired emergency generators to produce power for critical operations in the foundry in case of outage. These generators will meet the emission standards listed in NSPS Subpart IIII which has just been recently updated and is being proposed as BACT for that operation.

BACT for all the VOC emitting sources are summarized in Table 5-21.

Section 6
Air Quality Analysis

This section presents the Air Quality Analysis (Analysis) conducted to demonstrate that the FWNA facility will not cause or contribute to a violation of the National Ambient Air Quality Standards (NAAQS) or the Prevention of Significant Deterioration (PSD) Class I or Class II increments. The Analysis also confirms compliance with 401 KAR 63:020, which regulates potential hazardous matter and toxic air pollutants (TAPs), and evaluates the potential for secondary formation of ozone and fine particulate matter (PM2.5).

The PSD program is authorized under Part C of Title I of the Clean Air Act (42 U.S.C. §§7470–7492) and implemented through federal and state regulations, including 40 CFR Part 52.21 and 401 KAR 51:017. PSD requirements apply to areas designated as "attainment" or "unclassifiable" for all criteria pollutants. Simpson County, the location of the FWNA facility, currently holds such a designation and is therefore subject to PSD permitting requirements.

The FWNA facility qualifies as a PSD major source due to permitted emissions exceeding 100 tons per year (tpy) for carbon monoxide (CO) and volatile organic compounds (VOCs). Additionally, the facility has significant emission rates (SERs) for particulate matter (PM), PM_{10}, and $PM_{2.5}$.

Because the proposed project exceeds both the PSD major source thresholds for CO and VOC and the SERs for other regulated pollutants with established Significant Impact Levels (SILs), NAAQS, and PSD increment standards, a detailed air dispersion modeling analysis was performed in accordance with the Air Dispersion Modeling Protocol submitted to the Kentucky Division for Air Quality (KDAQ) and the subsequent KDAQ comments.

Initial screening results indicate exceedances of the PSD SILs for PM_{10} and $PM_{2.5}$, triggering the need for a cumulative impact analysis. The cumulative modeling results, presented in the following sections, demonstrate that the proposed project will not cause or contribute to exceedances of the NAAQS or PSD increment consumption thresholds.

All air dispersion modeling input files and additional supporting modeling information will be provided electronically in a separate submittal.

6.1 Modeling Methodology

Prior to conducting the Analysis an Air Dispersion Modeling Protocol document was submitted to KDAQ for review and comment. KDAQ comments were received on August 20, 2025. Those comments and the submitted protocol are provided in Appendix Q.

The air dispersion modeling addressed both the 2021 and 2025 comments received from KDAQ and USEPA Region 4 including the following:

1. The parallel version of AERMOD (AERMOD Breeze) was not utilized so an equivalent demonstration was not necessary.

2. The Analysis uses the most recent meteorological data for years 2020-2024 as provided by KDAQ.
3. As addressed below and in the appendices, all increment consuming sources provided by KDAQ were evaluated. See appendices, tables, and electronic files provided that support the application for validation.
4. A formal request for pre-construction monitoring waiver was submitted. The request is provided in Appendix R.
5. Justification for the use of existing ambient air monitors to provide background concentrations used in the model was provided in the 2025 protocol and addressed within this section.
6. An FLM/USFS Request for Determination form was prepared and submitted.
7. Air toxics analysis was prepared and completed by modeling the concentrations and comparing those to the Region 9, November 2024 Region Screening Level (RSL).
8. The NAAQS and PSD Increment modeling inventory was revised to reflect any changes to existing sources or additions to new sources in the area as addressed below, in the appendices or in the electronic files provided.
9. The final modeling report should document the basis for the emission rates used in the SIA modeling. Table 6-2 provides the emission rates with corresponding support for those emission rates provided in Appendix D. A
10. The Class I significant impact level (SIL) for the impact of modeled annual $PM_{2.5}$ emissions is compared to a concentration of 0.13 µg/m^3.
11. *A full 360 degree circumference of receptors were established at a distance of 50 km to compare modeling concentrations to the Class I SIL.*
12. *For comparing modeled concentrations to the $PM_{2.5}$ Class I SIL, project related secondary PM2.5 impacts (project related SO2 and NOx emissions) are considered.*
13. If necessary, the air dispersion modeled concentrations for the Class I annual $PM_{2.5}$ increment are compared to a concentration of 0.03 µg/m^3.
14. *The cumulative $PM_{2.5}$ increment consumption analysis, if required, should account for both the direct and the secondary component of $PM_{2.5}$ increment consumption from direct $PM_{2.5}$ emissions and precursor SO_2 and NO_X emissions from any nearby $PM_{2.5}$ increment sources*

A brief summary of the protocol is provided in the sections below:

6.1.1 Model Selection

The U.S. EPA's AERMOD dispersion model (version 24142) was used to conduct the air quality modeling analysis. AERMOD incorporates a state-of-the-science downwash algorithm and relies on AERMET, a meteorological preprocessor that applies current planetary boundary layer theory to derive dispersion coefficients from site-specific meteorological data.

The modeling was conducted using the regulatory default option, which includes:

- Stack-tip downwash to account for plume rise interference due to nearby structures; and
- Calm wind and missing data processing routines, ensuring proper averaging and continuity in modeled concentrations under low wind or incomplete meteorological conditions.

6.1.2 Meteorological Data

EPA modeling guidance allows the use of five years of off-site meteorological data or at least one year of on-site meteorological data. KDAQ provided meteorological data for the years 2020 through 2024.

6.1.3 Building Downwash

Emission sources were evaluated for potential building downwash effects based on their proximity to nearby structures. This assessment determines whether stack discharges may be entrained in turbulent wakes generated by wind flow around buildings. Such turbulence can significantly enhance plume dispersion and inhibit plume rise compared to unobstructed conditions.

To account for these effects, the modeling incorporated the Plume Rise Model Enhancements (PRIME) algorithm within AERMOD. Building dimensions were derived using the EPA's Building Profile Input Program (BPIP), which calculates direction-specific wake effects based on structure geometry.

Site-specific building and structure layouts were digitized and processed using BREEZE® BPIP software, which integrates the EPA-sanctioned BPIP-PRIME algorithms. This approach ensures accurate representation of dominant downwash structures and their influence on plume behavior across all wind directions.

6.1.4 Model Terrain

Terrain elevations for all modeled receptors, sources, and structures were derived from the U.S. Geological Survey (USGS) National Elevation Dataset (NED). These elevations were processed using AERMAP version 24142, the terrain preprocessor for AERMOD.

In addition to elevation, AERMOD requires a receptor-specific parameter known as the hill height scale, which supports its terrain-adjusted dispersion algorithms. AERMOD uses a critical dividing streamline approach to interpolate plume behavior between horizontal and terrain-following states. This method assumes that under certain meteorological conditions, a portion of the plume may ascend and pass over terrain features, while the remainder may be deflected and travel around them.

The hill height scale is calculated by AERMAP as a measure of the terrain feature within the modeling domain that would exert the greatest influence on plume behavior at each receptor. While it does not represent the critical dividing streamline height itself, it provides essential input for determining that height on an hourly basis using meteorological data.

Per Section 2.2.1 of the AERMOD User's Guide, the NED array boundary must encompass all terrain features that exceed a 10% elevation slope from any receptor to ensure accurate hill height scale calculations. The modeling domain was defined using the automated slope-based coverage feature in BREEZE® AERMOD, which ensures compliance with this requirement and optimizes terrain data handling. The terrain elevation for each modeled receptor, building, and source will be determined using the USGS National Elevation Dataset (NED).

6.1.5 Urban/Rural Determination

As with the initial construction modeling, the facility remains located in a predominantly rural area. Therefore, rural settings will be selected in AERMOD.

6.1.6 Receptor Grid Coordinate System

The Cartesian receptor grid used for the initial and subsequent construction demonstrations was retained for the Significant Impact Concentration (SMC) and Significant Impact Area (SIA) model runs. All receptors were placed using the UTM WGS84 coordinate system, with spacing designed to capture concentration gradients at varying distances from the facility:

- 100-meter spacing along the facility fenceline
- 100-meter spacing extending radially up to 4 kilometers from the facility center
- 500-meter spacing from 4 km to 10 km

The results of the SIA modeling established the extent of the SIA and informed the final receptor grid design. The 100-meter Cartesian grid surrounding the facility was used for NAAQS and PSD Increment modeling analyses.

Additional receptors were placed based on the locations of:

- Off-site sources
- Class I Areas, as applicable

This receptor configuration ensures adequate spatial resolution for capturing peak concentrations and regulatory thresholds across all modeling domains..

6.2 Modeled Emission Sources

The Significance Analysis evaluates the emission increases attributable solely to the proposed project. It excludes contributions from regional off-site sources and other existing facility sources, focusing strictly on project-related impacts.

In contrast, the National Ambient Air Quality Standards (NAAQS) Analysis incorporates both on-site and off-site sources of the pollutants of concern. This comprehensive approach ensures that cumulative impacts are assessed in accordance with U.S. EPA guidance.

All modeled emission sources at the FWNA facility were evaluated at their maximum hourly emission rates for each pollutant. This conservative approach ensures that worst-case impacts are captured during dispersion modeling.

The only emission sources excluded from the modeling were the emergency generators, which are permitted to operate up to 500 hours per year. Per EPA guidance, sources with limited, intermittent, and unpredictable operation—such as emergency generators—may be excluded from air quality modeling analyses when their contribution is deemed negligible and not representative of typical facility operations.

Off-site sources were obtained from both the Tennessee Department of Environmental Conservation (TDEC) and Kentucky Division for Air Quality (KDAQ) and evaluated as discussed below for inclusion in the NAAQS and PSD Increment modeling analysis.

6.3 Class II Significance Analysis

The Class II Significance Analysis was conducted to evaluate whether emission increases associated with the proposed project would result in significant ambient air impacts in the surrounding area. This analysis serves as a screening tool to determine the need for further cumulative modeling under PSD and NAAQS requirements.

The analysis included the following pollutants:

- Particulate Matter ≤10 microns (PM_{10})
- Particulate Matter ≤2.5 microns ($PM_{2.5}$)
- Carbon Monoxide (CO)

Significant impacts are defined as modeled concentrations exceeding the Significant Impact Levels (SILs), presented in Table 6-1.

6.3.1 Receptor Grid Coordinate System

The receptor grid used for the SIL evaluation was based on a Cartesian layout using the UTM WGS84 coordinate system, with the following spacing:

- 100-meter intervals from the facility center to 4,000 meters
- 500-meter intervals from 4,000 to 10,000 meters

Figures 6-1 and 6-2 illustrate the locations of buildings, receptors, and property boundaries. Figure 6-3 shows the receptor grid used for the SIL and SMC evaluations.

6.3.2 Modeling Approach and Results

All FWNA emissions units were included in the SIL and SMC analyses and evaluated at their maximum hourly emission rates for each pollutant as identified in Table 6-2 and supported by the emission calculations provided in Appendix D. The hourly emission rates can be verified by review of the hourly emission rate worksheet included in Appendix D and the corresponding emission unit and control device worksheets. All modeled stack parameters have been verified and are shown in Table 6-2.

Emergency generators were excluded from the analysis in accordance with EPA guidance, which allows exclusion of sources with limited, intermittent, and unpredictable operation (e.g., permitted for ≤500 hr/year).

Modeled results correspond to highest 1-hour (H1H) impacts over a five-year meteorological period. Results are summarized in Table 6-3, with graphical outputs provided in Figures 6-4 through 6-7.

Key findings:

- CO: Modeled concentrations did not exceed the SILs for either the 1-hour or 8-hour averaging periods, therefore no further modeling is required
- PM_{10}: Exceeded the 24-hour SIL, therefore cumulative modeling is required
- $PM_{2.5}$: Exceeded both 24-hour and annual SILs, therefore cumulative modeling is required

The maximum extent of SIL exceedance was identified from the $PM_{2.5}$ 24-hour modeling results, which showed ambient concentrations exceeding the SIL threshold at a distance of 2,680 meters from the facility. The other distances are identified in the figures and range from 490 to 2,110 meters. Information supporting the maximum distance to the receptor exceedance is provided in an Excel workbook provided in the modeling electronic files.

Accordingly, a 2,680-meter radius was established to define the Significant Impact Area (SIA) for all subsequent NAAQS and PSD Increment compliance demonstrations. This radius ensures that all receptors within the zone of significant impact are included in cumulative modeling analyses, consistent with EPA guidance and PSD permitting requirements.

6.4 Ambient Monitoring Requirements

The PSD Significance Analysis also serves to determine whether the applicant is subject to pre-construction ambient air monitoring requirements. This determination is based on a comparison of the maximum modeled impacts attributable to the proposed project against the Significant Monitoring Concentrations (SMC) defined in 40 CFR §52.21(i)(5)(i). Applicable SMC thresholds for PM_{10}, $PM_{2.5}$, and CO are presented in Table 6-1.

A pre-construction air quality analysis using continuous monitoring data may be required for pollutants subject to PSD review per 40 CFR 52.21(m). If either the predicted modeled impact from an emissions increase or the existing ambient concentration is less than the SMC, an applicant may be exempt from pre-construction ambient monitoring. The SMC value for $PM_{2.5}$ was vacated on January 22, 2013; however, EPA has responded to the vacatur by indicating that existing background monitors should be sufficient to fulfill the ambient monitoring requirements.

As shown in Table 6-4, the CO SMC was not exceeded, therefore, preconstruction monitoring is not required. The SMC was exceeded for the 24-hour PM_{10} and $PM_{2.5}$ and therefore preconstruction monitoring may be required. Below addresses the request that the preconstruction monitoring requirement be met with existing regional monitors.

6.4.1 Pre-Construction Monitoring Waiver Request

By letter dated July 14, 2025, FWNA requested a waiver from the 40 CFR 52.21(m) requirement to conduct pre-construction site-specific monitoring of ambient air for the purpose of establishing background concentrations for the permit application required air quality impact analysis. The request is provided in Appendix R. No response has been received at the time of the application.

6.4.2 Ambient Background Concentrations

As part of the KDAQ response to the 2021 waiver request FWNA was assigned the responsibilities of providing sufficient justification of a representative background monitoring location that fulfills the requirements of 401 KAR 51:017 and 40 CFR Part 51, Appendix W. This request was fulfilled in the submitted 2025 Air Dispersion Modeling Protocol but is also provided below.

The purpose of representative background monitoring concentrations is to account for concentrations that are not attributed to the source or site being evaluated and

not explicitly modeled in the air dispersion modeling analysis. The background concentration is to account for other emission sources such as natural sources, nearby sources other than the sources under consideration.

Per Section 8.3 of Appendix W, when determining background concentrations, the following should be considered:

- Background should not include the ambient impact of the project source or other nearby sources that are accounted for in the modeling;
- Ambient concentrations from natural sources in the area are typically accounted for in the background concentration.
- The dataset should be of sufficient completeness and follow appropriate data validation procedures.

$PM_{2.5}$ Background Concentration Determination

The nearest $PM_{2.5}$ monitor is located at 226 Sunset Street, Smiths Grove, Bowling Green, Kentucky (Smiths Grove - AQS Site ID 21-227-0009). This monitor was used in the previous permit applications. The monitoring location is classified by USEPA as being "Residential," but the location is near a heavily populated and traveled area. The resulting background concentrations from the Bowing Green monitor is provided in Table 6-5.

PM_{10} Background Concentration Determination

The PM_{10} background monitoring location used for the Franklin, Kentucky site in the 2016 permit application was from the Nashville Monitor (AQS ID: 47-037-0024) active 2000 through 2016 located at 56th Avenue and Louisiana Streets in Nashville, TN. The 2022 permit application used the nearest PM_{10} monitor located at 105 South 17th Street, Nashville, TN (Davidson County) at the Lockland School (Lockeland Monitor – AQS Site ID 47-037-223).

The Lockeland Monitor was concerning for several reasons. It is labeled "Industrial," which often suggests influence by nearby point or area sources. Franklin's terrain and zoning is more rural-industrial mix — not urban-core like East Nashville.

To identify a better alternative that aligns with EPA guidance, an evaluation of the Lockeland Monitor and other proximal monitors is provided in Table 6-6. Preferably the representative wind orientation would be upwind or crosswind, similar land use to the modeling site, high data completeness, ideally be rural.

Evansville, IN monitoring location better meets the established criteria due to the following:

- Crosswind orientation that minimizes source influence while reflecting regional background conditions
- Land use compatibility including agricultural and light industrial areas on the county periphery, similar to the FWNA facility
- Terrain and elevation reasonably consistent with Simpson County (~116 m vs ~198 m)
- High data completeness (≥98%) across multiple years ensuring robust background estimation

- Monitor classified as urban, but with peripheral conditions aligning more closely to rural Simpson County

To develop background concentrations, monitoring values were downloaded from EPA AirData Air Quality Monitors database for the Evansville, Indiana site. Using calendar years 2022-2024, the resulting background concentration for the 24-hour PM_{10} standard is 60 µg/m^3 (significantly higher than the 35.67 µg/m^3 used in the previous application) as provided in Table 6-7.

Both the Evansville and Bowling Green monitors meet the above requirements and provide a conservative background concentration for the FWNA location as both areas are urban locations.

6.5 Regional Inventory Data

As identified above, the SIL was exceeded for the PM_{10} 24-hour standard, $PM_{2.5}$ 24-hour standard and the $PM_{2.5}$ annual standard. As such, it was necessary to develop regional inventory data for Class II modeling for each of these standards. Because of the facilities proximity to Tennessee, in addition to KDAQ, Tennessee Department of Environmental Conservation (TDEC) provided emission inventories of potential sources that can impact the air quality within the impact area.

The regional modeling inventory information was compiled by determining all sources from the KDAQ and TDEC inventories located within a 50 km radius of the FWNA facility. As provided for in the air dispersion modeling protocol, EPA's 20D rule was used as a screening technique to allow the elimination of any sources where emissions (in tpy) are less than 20 times the distance from the source. Prior to applying the "20D Rule" various emission sources at a single facility were combined such that they were not eliminated. The workbooks in electronic format showing the reduction in facilities are provided in the Electronic Air Dispersion Modeling Files. Following the evaluation and removal of the portable sources and the shutdown of the Brite Metal facility, only the RKW North America facility remained. Following the review of the RKW North America facility Air Permit, Tables 6-8 through 6-11 provide the emission rates and stack parameters for RKW North America used in the PM_{10} and $PM_{2.5}$ NAAQS and PSD Increment modeling analysis. The RKW North America Air Permit is provided in Appendix S.

6.6 Cumulative Modeling Analysis

A Cumulative Analysis modeling was required for PM_{10} and $PM_{2.5}$ based on the screening model results discussed above; therefore, modeling was performed to demonstrate compliance with the NAAQS standards and PSD Increment values identified in Table 6-1.

6.6.1 National Ambient Air Quality Standard Modeling Results

To demonstrate compliance with the $PM_{2.5}$ annual standard, each year of meteorological data was modeled and the highest value from each of the five models was compared to the annual standard. To demonstrate compliance with the $PM_{2.5}$ and PM_{10} 24-hour standards the models were run with all five years of meteorological data. The NAAQS modeling includes all FWNA emission units at their maximum hourly emission rates identified in Table 6-2, as well as the RKW North America facility at the emission rates shown in Tables 6-8 and 6-9. The refined PM_{10} and $PM_{2.5}$ modeling (NAAQS and PSD Increment) included only those receptors that

were within the largest calculated SIA for the respective averaging time (as determined above the SIA is a radius of 2,680 m from the facility).

Figure 6-8 identifies the receptor locations for the refined modeling at 100-meter spacing from the facility to 2,680 meters in each direction. Source included in the modeling were the FWNA sources along with the applicable off-site sources.

Table 6-10 presents the summary of results for PM_{10} 24-hour and $PM_{2.5}$ Annual model runs and demonstrates compliance with their respective NAAQS standards.

6.6.2 PSD PM_{10} and $PM_{2.5}$ Increment Modeling Results

In addition to NAAQS modeling, the modeling also must demonstrate compliance with the PSD increment. The PSD increment, which can only be assessed through modeling, is the means by which the PSD rules prevent air quality from being deteriorate any more than that threshold.

The analysis starts with a baseline date and any emission sources added after that baseline date are included in the increment model runs. For major sources of PM_{10} the baseline date started in 1987 for $PM_{2.5}$ it was 2010. For minor sources, the baseline date is established by the initial complete PSD application submitted in the Baseline Impact Area. This permit application was submitted on July 13, 2016, by FWNA. Therefore, the final off-site source list must include any source. installed or modified after that date. RKW North America EU06 and EU09 printing lines were installed after the July 13, 2016 data and are included in the PSD Increment Modeling at the emission rates and stack parameters shown in Table 6-11 and 6-12.

Table 6-13 compares the highest second high modeling 24-hour result for the each of the five years of meteorological data to the increment limit for PM_{10} and $PM_{2.5}$ while the highest high modeling results for each of the five years of meteorological data is used for the corresponding annual increment. As shown in table, all impacts were less than the standard.

6.7 Class II Modeled Emission Rates for Precursors (MERPs) Analysis

KDAQ released a document entitled “Guidance on the Use of EPA’s Modeled Emission Rates for Precursors (MERPs) for Secondary Pollutant Formation in Kentucky PSD Projects” on November 13, 2024 following review of EPA’s April 30, 2024 memorandum clarifying information on the development Application of the . ’s Modeled Emission Rates for Precursors (MERPS) for Secondary Pollutant Formation in Kentucky.” Following release of this document, on April 30, 2019, USEPA issued an update to their guidance entitled “Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program.”

When modeled design concentrations are less than the applicable SIL, further analyses (NAAQS and PSD Increment) are not required for that pollutant-averaging period. If modeled impacts are greater than the SIL, a full NAAQS and PSD Increment analysis is required for that pollutant and averaging period to demonstrate that the facility neither causes nor contributes to any exceedances.

In accordance with the revised and updated 40 CFR 51, Appendix W, precursor emission impacts to ozone and $PM_{2.5}$ (secondary $PM_{2.5}$) must be considered as part of the modeling analysis. The precursors to ground-level ozone formation are VOC and NOX, and the precursor emissions for secondary $PM_{2.5}$ formation are NO_X and SO_2.

Elevated ground-level ozone concentrations are the result of photochemical reactions among various chemical species. These reactions are more likely to occur under certain ambient conditions (e.g., high ground-level temperatures, light winds, and sunny conditions). The chemical species that contribute to ozone formation, referred to as ozone precursors, include NO_X and VOC emissions from both anthropogenic (e.g., mobile, and stationary sources) and natural sources (e.g., vegetation). Pursuant to 40 CFR 52.21, ambient ozone monitoring is not required unless a project's emissions increase is greater than one hundred tpy of VOC or NOX.

6.7.1 MERPs Ozone and $PM_{2.5}$ Source Impact Analysis

The MERPs Source Impact Analysis assesses air quality impacts from the proposed new source only. The projected air quality impact from the source is calculated and compared to the applicable SIL to determine if the Tier 1 demonstration is satisfied or if a cumulative impact analysis is necessary.

Ozone Source Impact Analysis

As Outlined in Table 3 of the KDAQ 2024 guidance, the default MERP values (tpy) for KDAQ applications are 170 tpy NOx and 2,939 tpy VOC for the 8-hour ozone standard.

For the Source Impact Analysis, the guidance indicates the following equation [Guidance Eq. 2] should be used for the initial analysis and nothing further is required if this standard is met:

$$\frac{NOx\ Emission\ Rate}{NOx\ MERP} + \frac{VOC\ Emission\ Rate}{VOC\ MERP} < 1$$

Solving for the above equation provides the following result:

$$\frac{13.24}{170} + \frac{223.47}{2939} < 1$$

$$0.08 + 0.08 < 1$$

$$0.16 < 1$$

As the predicted ozone value is less than the threshold value of 1, the predicted impact of the projects is less than the ozone SIL (1 ppb). Therefore, there are no adverse impacts associated with precursor emissions for ozone, and a cumulative ozone analysis is not required.

$PM_{2.5}$ Source Impact Analysis

As outlined in Table 3 of the KDAQ 2024 guidance, the default MERP values (tpy) for KDAQ applications are 2,922 tpy NO_X and 1,433 tpy SO_2 for daily $PM_{2.5}$ and 5,476 tpy NO_X and 6,321 tpy SO_2 for annual $PM_{2.5}$.

The KDAQ 2024 guidance provides the following equation [Guidance Eq. 3] for determining if a cumulative analysis is necessary when the project emissions exceed the $PM_{2.5}$ significant emission rate (SER) of ten (10) tpy:

$$\frac{Max\ PM2.5\ ModeledConcentration}{PM2.5\ SIL} + \frac{SO2\ Emission\ Rate}{SO2\ MERP} + \frac{NOx\ Emission\ Rate}{NOx\ MERP} < 1$$

24-hour $PM_{2.5}$ Discrete Analysis:

Substituting the values for the 24-hour $PM_{2.5}$ standard:

$$\frac{10.50}{1.2} + \frac{0.88}{1{,}433} + \frac{13.24}{2{,}922} > 1$$

$$8.75 + 0.0006 + 0.0045 > 1$$

$$8.76 > 1$$

Annual $PM_{2.5}$ Discrete Analysis:

Substituting the values for the Annual $PM_{2.5}$ standard:

$$\frac{1.86}{0.13} + \frac{0.88}{6{,}321} + \frac{13.24}{5{,}476} > 1$$

$$14.31 + 0.0001 + 0.0024 > 1$$

$$14.31 > 1$$

As the resultant 24-hour and Annual PM2.5 values exceed one (1), a cumulative analysis is required.

6.7.2 MERPs $PM_{2.5}$ Cumulative Analysis

Because both the 24-hour and Annual $PM_{2.5}$ discrete analysis resulted in values greater than 1 a cumulative analysis must be conducted. Per the 2024 Guidance, the $PM_{2.5}$ cumulative analysis uses the following equation [Guidance Eq. 5]:

$$PM2.5\ BG + PM2.5\ DV + \left(\frac{SO2\ Emission\ Rate}{SO2\ MERP} + \frac{NOx\ Emission\ Rate}{NOx\ MERP}\right) x\ PM2.5\ SIL \leq PM2.5\ NAAQS$$

24-hour $PM_{2.5}$ Cumulative Analysis:

$$17.90 + 6.81 + \left(\frac{0.88}{1{,}433} + \frac{13.24}{2{,}922}\right) x\ 1.2 \leq 35$$

$$17.90 + 6.81 + (0.0006 + 0.0045)\ x\ 1.2\ \leq 35$$

$$17.90 + 6.81 + (0.0006 + 0.0045)\ x\ 1.2\ \leq 35$$

$$24.72\ \leq 35$$

Annual $PM_{2.5}$ Cumulative Analysis:

$$6.90 + 1.86 + \left(\frac{0.88}{6{,}321} + \frac{13.04}{5476}\right)\ x\ 0.13\ \leq 9$$

$$6.90 + 1.86 + (0.0001 + 0.002)x\ 0.13\ \leq 9$$

$$8.76\ \leq 9$$

Both 24-hour and annual PM2.5 concentrations met the requirements of the cumulative analysis.

6.8 Class I Significance Analysis

Class I areas are federally protected areas for which more stringent air quality standards apply to protect unique natural, cultural, recreational, and/or historic values. The current Federal Land Manager (FLM) policies, as outlined in the FLAG document (2010 Federal Land Air Guidance) state that any Class I areas within 300 km of the proposed source as well as any other Class I areas that may be potentially affected should be identified and evaluated for potential air quality impacts on those Class I areas.

Table 6-14 lists these Class I areas, their location coordinates, their distance from the proposed site. each location. The below sections evaluate the potential impacts to those Class 1 area locations.

6.8.1 Class I Area Screening (Q/D) Analysis

There are five Class I areas within 300 km of the proposed FWNA foundry, the closest area is Mammoth Cave located approximately 51 km northeast of the proposed site.

To demonstrate the project will have no significant impacts on Class I air quality relative value (AQRV) including visibility the Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report provides a Q/D screening criteria if the Class I Area is more than 50 km away. The Q/D screening criteria indicates that if the total sulfur dioxide (SO_2), nitrogen oxides (NO_x), PM_{10}, and sulfuric acid mist (H_2SO) annual emissions (in tons per year, based on 24-hour maximum allowable emissions), divided by the distance (in km) from the Class 1 area is less than 10, then the project is assumed to have no impact on AQRVs.

As shown in Table 3-2, the total annual visibility affecting emissions from the FWNA facility is 42.6 tpy (28.48 tpy PM_{10} + 0.88 SO_2 + 13.24 tpy NO_x). As the nearest Class I area is fifty-one (51) kilometers away, the resulting Q/D is 0.84, which is well below the threshold of 10.

6.8.2 Class I Significant Impact Evaluation

To evaluate the maximum potential impact of the FWNA facility on the Class I areas, AERMOD was used to determine concentrations at the boundary of the model to show the concentrations are less than the Class I SIL values identified in Table 6-15.

To accomplish this, receptors were placed at a radius of 50 km from the facility spaced 1/10 of 1° degree between receptors. The resulting receptor network is shown in Figure 6.9. To conduct the analysis the 2020 – 2024 meteorological data was used. The highest 24-hour and annual PM_{10} and $PM_{2.5}$ concentrations are 0.0075 and 0.1550 µg/m^3, respectively. As shown in Table 6-15 these values represent concentrations that are between 25 to 57% of the Class I SIL values.

6.8.3 Class I MERPs Tier 1 Demonstration

In accordance with the U.S. EPA's April 30, 2024 memorandum titled Clarification on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program, the applicant has utilized the MERPs framework to assess secondary $PM_{2.5}$ impacts associated with precursor emissions. This guidance clarifies the appropriate use of MERPs in light of updated Significant Impact Levels (SILs) and the strengthened annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS). Rather than relying on fixed emission rate thresholds, the revised approach emphasizes a normalized air quality impact comparison against critical SIL values. This method provides a technically sound and policy-consistent pathway for demonstrating that precursor emissions—such as NO_x and SO_2—do not cause or contribute to $PM_{2.5}$ concentrations exceeding the applicable SILs, thereby supporting exemption from cumulative modeling requirements under Tier 1 analysis.

The Franklin, Kentucky facility is located approximately 51 miles northeast of Mammoth Cave National Park, the nearest Class I area. AERMOD modeling of primary $PM_{2.5}$ emissions indicates maximum predicted concentrations of 0.0075 µg/m³ (annual) and 0.1550 µg/m³ (24-hour) at the AERMOD 50 km boundary. These values represent 57% and 25% of the respective Class I Significant Impact Levels (SILs), which are 0.03 µg/m³ (annual) and 0.27 µg/m³ (24-hour).

As clarified in the EPA's April 30, 2024 memorandum, modeled concentrations below the SIL thresholds are considered not to cause or contribute to a violation of the NAAQS or PSD increments, satisfying Tier 1 demonstration requirements for direct $PM_{2.5}$ emissions.
To evaluate secondary $PM_{2.5}$ impacts from precursor emissions (NO_x and SO_2), the applicant should apply the MERPs framework as outlined in the same memo. This approach normalizes precursor emissions against modeled air quality impacts, allowing for a quantitative comparison to SIL values. The following section presents the MERPs-based analysis for secondary $PM_{2.5}$ formation at Mammoth Cave.

To assess secondary $PM_{2.5}$ formation from precursor emissions, the approach beginning at the bottom of page 4 of the Attachment to the April 30, 2024, EPA Memo "Clarification on the Development of the Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program" was used.

Specifically, page 6 of the memo states "the initial screening step would be to select one or more of the hypothetical sources modeled as part of the illustrative assessment providing in this document that are found to be similar to the project source. The modeled maximum secondary

$PM_{2.5}$ impacts at or greater than 50 km would be used in combination with the primary $PM_{2.5}$ impacts estimated using AERMOD at 50km downwind of the source for comparison to the EPA recommended $PM_{2.5}$ Class I SIL value. In addition, if the result of the initial screening step show an exceedance of the $PM_{2.5}$ Class I SIL value a second more refined screening step would involve selecting the highest modeled secondary PM2.5 impact at or less than the downwind distance of the Class I area relative to the project source.

From the Attachment's Figure 4-2, the 24-hour and Annual secondary impacts 50 km from a 500 tpy surface level source of NO_X emissions is 0.026 and 0.002 ug/m3, respectively. Following the Attachment's methodology yields the following results:

For the 24-hour Secondary $PM_{2.5}$ impact associated with NO_X:

$$13.25\ tpy\ NOx\ x\ \frac{1}{500} tpy\ NOX\ x\ 0.026 \frac{ug}{m3} = 0.0007 \frac{ug}{m3}$$

For the Annual Secondary PM2.5 impact associated with NO_X:

$$13.25\ tpy\ NOx\ x\ \frac{1}{500} tpy\ NOX\ x\ 0.002 \frac{ug}{m3} = 0.0001 \frac{ug}{m3}$$

Regarding the 24-hour secondary $PM_{2.5}$ impact associated with sulfur dioxide, insufficient information was provided in the above identified memo and Attachment, therefore a graph was developed of secondary $PM_{2.5}$ emissions associated with the emissions of SO_2 at various distances. The graph is included as Figure 6-13. The graph is used to generate the following estimates of 24-hour and Annual secondary $PM_{2.5}$ concentrations associated with 0.88 tpy SO_2 at a distance of 51 km.

Calculation:

1. Source scaling: 0.88 tpy ÷ 500 tpy = 0.00176 (scaling factor)
2. At 51 km from the elevated source chart:
    - Daily maximum ≈ 0.15 μg/m³ (for 500 tpy source)
3. Scaled concentration: 0.15 μg/m³ × 0.00176 = 0.00026 μg/m³

Key Considerations at 51 km:

- High conversion efficiency: 80% of SO2 converts to sulfate at this distance
- Molecular weight factor: $SO4^{2-}$/SO2 = 1.5
- Significant dispersion: Concentrations are much lower due to atmospheric mixing
- Chemical transformation time: ~2-4 hours transport time allows substantial secondary formation

Regulatory Context:

- This concentration (0.00026 μg/m³) is well below:
    - Class I PSD increment (24-hour): 0.27 μg/m³
    - Class II PSD increment (24-hour): 1.2 μg/m³

- PM2.5 NAAQS (24-hour): 35 µg/m³

The approximate concentration of 0.0003 µg/m³ for the 24-hour maximum secondary $PM_{2.5}$ sulfate concentration at 51 km reflects both the small source size (0.88 tpy) and the substantial dispersion that occurs over 51 km. Even accounting for modeling uncertainties, this source would have negligible impact on $PM_{2.5}$ concentrations at that distance.

To estimate the annual average secondary $PM_{2.5}$ concentration from 0.88 tpy SO2 at 51 km the calculation is as follows:

1. Source scaling: 0.88 tpy ÷ 500 tpy = 0.00176 (scaling factor)
2. At 51 km from the elevated source chart:
    - Annual average ≈ 0.009 µg/m³ (for 500 tpy source)
3. Scaled concentration: 0.009 µg/m³ × 0.00176 = 0.000016 µg/m³

Key Factors at 51 km:

- High SO_2 to sulfate conversion: ~80% conversion efficiency over the transport time
- Atmospheric mixing: Annual average accounts for varying wind directions and stability classes
- Long-range transport: Plume is well-mixed vertically and horizontally
- Seasonal variations: Included in annual averaging

Regulatory Comparison:

- This concentration (0.000016 µg/m³) is extremely small compared to:
    - Class I PSD increment (annual): 0.03 µg/m³
    - Class II PSD increment (annual): 0.13 µg/m³
    - PM2.5 NAAQS (annual): 9.0 µg/m³

Similar to the above the resulting concentration of approximately 0.00002 µg/m³ for the annual average secondary $PM_{2.5}$ sulfate concentration at 51 km is due to both the limited emissions and the 51 km distance.

Results of the PM_{10} and $PM_{2.5}$ Class I SIL Analysis includes secondary $PM_{2.5}$ impacts is provided in Table 6-15.

6.9 Toxics Modeling

The project includes emissions of certain compounds that have a Regional Screening Level (RSL) value identified in EPA Region IX RSL tables. To demonstrate FWNA will comply with 401 KAR 63:020 that regulates potential hazardous matter or toxics substances (i.e., toxic air pollutants – TAPs) and in order to evaluate whether these toxic compounds are in sufficient concentration that they could present a health hazard, air dispersion modeling is conducted per KDAQ's request.

The same meteorological data and stack conditions described elsewhere are used to determine maximum annual ground level concentrations of each TAP. The maximum concentration of the receptors of concern are compared to the concentrations listed as having a significant health threat in

EPA Region IX "Regional Screening Level (RSL) Resident Ambient Air Table (TR=1E-6, HQ=1) November 2024".

Similar to the initial application Figure 6-11 provides an area map and on this map, we located model receptors at location where individuals may be present for an extended period (residences, work areas etc.). This sensitive receptor set was then input to the model and using the same meteorological data and stack conditions described in this section, AERMOD was used to calculate the maximum annual ground level concentrations of each of the toxic compounds at each receptor.

The maximum concentration of all the receptors was compared to the RSL. Table 6-16 provides the results of this modeling that demonstrates the maximum concentration found in our modeling are below the RSL listed values. The modeling files are provided electronically.

Section 7
Other Impact Analysis

PSD regulations require that additional impacts be considered as part of a PSD permit action. These include a growth analysis and a soil and vegetation analysis. The effect of the proposed project's emissions on local soils and vegetation is addressed through comparison of modeled impacts to secondary NAAQS and other relevant screening criteria that have been developed by the U.S. EPA to provide protection for public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

An economic growth analysis is intended to assess the amount of new growth that is likely to occur in support of the new project and to estimate emissions resulting from associated growth. Associated growth relates to any residential and commercial/industrial growth that may result from the construction of the proposed project. Residential growth depends on the number of new employees and the availability of housing in the area, while associated commercial and industrial growth consists of new sources providing services to the new employees and the facility.

This AIA assesses the environmental impact on soils, vegetation, and when necessary, the visibility caused by the increase in emissions following the projects and any associated impact resulting from associated industrial, commercial, and residential growth. A separate task to assess the ambient air quality following the changes is completed and resulted in the demonstration that compliance with the National Ambient Air Quality Standards (NAAQS) and PSD Increments is provided in Section 6 of this document.

7.1 Ambient Air Quality Analysis

The ambient air quality analysis projects the air quality that will exist in the area of the proposed source during construction and after the plant begins operation.

As part of the PSD permit application, air dispersion modeling is conducted to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS) and PSD Increments for significant pollutants of concern. The modeling included the foundry and machining emissions, nearby emission sources that could potentially impact the proposed location, and background concentrations to predict the resultant maximum ambient air quality impacts around the constructed facility. The results of the air dispersion modeling showed compliance with all applicable standards and/or requirements.

7.2 Class I Visibility

Visibility can be affected by plume impairment or regional haze. Plume impairment results when there is a contrast or color difference between the plume and a viewed background (the sky or a terrain feature). Plume impairment is generally only of concern when the Class I area is near the proposed source (i.e., less than 50 km). As the Mammoth Cave National Park is just over 50 km, the possibility of plume impairment will be assumed.

To address the above, the EPA New Source Review Workshop Manual recommends that a visibility analysis be conducted. There are three levels for the visibility analysis: Level 1, Level 2, and Level 3. A

Level 1 analysis is the most conservative and if the visibility screening criteria is not exceeded no further analysis is required.

VISCREEN was used to assess possible impacts on visibility due to the proposed project. VISCREEN is an EPA-approved model that assesses the visibility of plumes of emission sources from a vantage within the nearest Class I area. VISCREEN uses a very conservative approach to assess visibility impacts as it uses the "worse-case" meteorological values for wind speed and stability class.

VISCREEN requires inputs of emissions of particulate matter and nitrogen oxides (primary NO_2, primary SO_4 and soot are also considered if present). Table 3-2 annual PM and NOx emissions rates of 28.48 tpy and 13.24 tpy, respectively were used are shown in Table 7-1. Detailed emission calculations for total PM and NO_x can be found in tables in Appendix D.

The nearest Class I area is Mammoth Caves National Park located north-northeast from FWNA with a nearest boundary of 51 km and the farthest boundary of the wilderness area is estimated at 62 km. The observer distance was chosen at the nearest Class I area boundary. The analysis used EPA-recommended default parameters, including a background visual range of 180 kilometers, high terrain contrast, and conservative plume characteristics.

The VISCREEN Summary Report is provided in Appendix T and includes the distance and the observer angles, theta, azi, and alpha, present conservative line of sight values that maximize the light-scattering properties of the emissions from the proposed source. Results are given in the "Plume" columns of both the Delta-E and Contrast parameters. The criteria are also provided for comparison. The Delta-E is the color difference parameter that specifies the perceived changes of color and brightness. This is the primary basis for determining the perceptibility of plume visual impacts. The criteria used by VISCREEN for Delta-E is 2.0. The threshold value of perceptibility has been traditionally 1.0 for Delta-E and 0.02 for contrast. The Contrast column is the green contrast (0.55 km) which has a criteria value of 0.05.

Results showed that within the Class I area, the maximum color difference (ΔE) values were 0.3 against a sky background and 0.8 against terrain—both well below the EPA screening threshold of 2.0, indicating no perceptible plume impact. However, outside the Class I area, ΔE values reached 5.3 (sky) and 6.4 (terrain) at a receptor located 1 kilometer from the source, exceeding the screening criteria and suggesting potential plume visibility. Based on these findings, the project passes Level 1 screening for impacts within Mammoth Cave National Park.

7.3 Secondary Impacts on Soil and Vegetation

No impacts are expected on soils or vegetation in either Simpson or the surrounding counties. Ambient concentrations of air pollutants that typically impact vegetation such as ozone, NO_x, and SO_2 are not significantly increased by the proposed project. The primary pollutant from the facility is carbon monoxide. NO_x and SO_2 emission increase were small enough that federal regulations do not require an ambient impact analysis. A qualitative assessment of the ozone impacts due to the direct emissions of VOC and NO_x was completed and has determined that it is very unlikely that secondary formation of ozone from VOC or NOx emissions, attributable to the project, will have a significant impact on the ozone levels in the area.

Conversion of nitrogen oxides (NO_x) and VOC emissions to tropospheric ozone is not instantaneous, but occurs over time, with the rate of conversion dependent upon weather conditions. The rate of ozone

production can be limited by either VOCs or NO_2. In general, ozone formation using these two precursors is reliant upon the relative sources of hydroxide (OH) and NO_x. In urban areas with a high population concentration, ozone is often VOC-limited. Ozone is generally NO_x-limited in rural areas and downwind suburban areas" (EPA-452/R-08-003 March 2008). Further, ozone formation is recognized as a regional and long-range transport issue. Therefore, it is very unlikely that secondary formation of ozone from VOC emissions attributable to the project will have a significant impact on the ozone levels in the area.

Particulate matter emissions from melting, pouring, cooling, shotblast, and grinding consist largely of oxides of iron. Particulate emissions from the mold and core production and shakeout consist mostly of sand, clay, and iron oxides. None of the particulate emissions are expected to have adverse impacts on soils or vegetation. Sand, clay, and iron oxides are common in the local soils. Particulate emissions from the foundry will not be acidic or caustic and are not expected to have any effects on soil, vegetation, or crops.

CO has not been found to produce detrimental effects on plants at concentrations below 100 ppm for exposures of one to three weeks. Since the ambient standards have been established at 35 ppm (40 mg/m^3) and 9 ppm (10 mg/m^3) for the 1-hour and 8-hour averages, respectively, there is no threat to plant life from CO emissions at the site.

7.4 Wildlife Impacts

Impacts to wildlife can occur due to direct uptake of pollutants through ingestion or via the skin and more indirectly as a result of air pollution induced changes to wildlife habitat and food source. Impacts of air pollution induced injury and death in wildlife has been focused on pollutants other than CO. It is likely any toxicity most severely in circumstances where air pollutants were likely elevated far above the ambient air quality standards (AAQS), or where significantly elevated concentrations of pollutants occurred on vegetation that is subsequently consumed.

A review of available information indicates there have been no observed adverse impacts to wildlife in the area due to the 1985 and 1992 projects. No pollutants were elevated above the AAQS nor were there elevated concentrations of pollutants that would have affected consumable vegetation.

7.5 Growth Analysis

The elements of the growth analysis include a projection of associated industrial, commercial, and residential growth that will occur in the area due to the proposed project and an estimate of the air emissions generated by such growth.

The FWNA foundry at full build-out will employ approximately two hundred and fifty people. This workforce comes from local communities, and because the foundry will be located approximately fifteen miles from Bowling Green, the remaining workforce will come from within that city area. Therefore, growth impacts are minimal and should not adversely affect the ambient air quality in the surrounding area. The site is bordered by two major roadways (I-65 and State Highway 31), so additional roadways are not planned.

No significant related increases in the residential, commercial, or industrial growth are anticipated in the area because of the construction and operation of the foundry and machining operations.

As no associated industrial or commercial growth is anticipated, no increase in “secondary emissions” or emissions from other facilities in the area are expected from the proposed construction of the new foundry.

7.6 Construction Impacts

The construction of the facility has already occurred. Please review the prior permit application packages if this subject is of interest.

Appendix A
Tables

Table 1-1. Phase 1 - PM, PM_{10} and $PM_{2.5}$ Emission Limitations

Control Device (Stack)	Emission Units Controlled	Type of Control and Pollutants Controlled	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02)	EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16, EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0010 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0010 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0006 gr/dscf 0.85 lb/hr 3.72 ton/yr

Table 1-2. PM, PM_{10} and $PM_{2.5}$ Emission Limitations (Phase 2 for CU01/ST02 and CU08/ST09)

Control Device (Stack)	Emission Units Controlled	Type of Control and Pollutants Controlled	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02)	EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0006 gr/dscf 0.850 lb/hr 3.72 ton/yr
CU06 (ST07)	EU22, EU23, EU24, EU26, EU27, EU28, EU29, EU30, EU31, EU32, EU53, EU54, EU55, EU56	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0015 gr/dscf 1.30 lb/hr 5.67 ton/yr
CU08 (ST09)	EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0015 gr/dscf 2.12 lb/hr 9.30 ton/yr
CU11 (ST12)	EU60, EU61, EU62, EU64, EU65	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0015 gr/dscf 0.792 lb/hr 3.47 ton/yr

Table 1-3. VOC and CO Emission Limitations

Stack or Vent	Emission Units Combined	BACT for VOC	BACT for CO
CU01 ST02	EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16	0.14 lb/hr; 0.61 ton/yr	2.11 lb/hr; 9.25 ton/yr
CU07 ST08	EU39, EU40, EU41, EU42	0.70 lb/hr; 1.67 ton/yr	N/A
CU08 ST09	EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59	20.8 lb/hr; 39.7 ton/yr	128 lb/hr; 235 ton/yr

Table 1-4. Shakeout Conveyor (EU53) - VOC and CO Emission Limitations

Emission Unit	Emission Unit Description	BACT for VOC	BACT for CO
EU53	Shakeout Conveyor	0.10 lb/ton gray iron; 4.58 ton/yr	1.00 lb/ton gray iron; 25.3 lb/hr

Table 1-5. CU01/ST02 - November and December 2018 Test Results

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/hr)	CO (lb/hr)
Emission Limit	0.0010	0.0010	0.0006	0.14	2.11
Performance Test Result	0.00063	0.0017	0.0017	0.28	26.37

Table 1-6. CU06/ST07 and EU53 - November and December 2018 Test Results

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/ton gray iron)	CO (lb/ton gray iron) (lb/hr)
Emission Limit	0.0025	0.0025	0.0015	0.1	1 25.3
Performance Test Result	0.00042	0.0120	0.012	0.2	0.3 5.13

Table 1-7. CU01/ST02 - March 2020 Test Results

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/hr)	CO (lb/hr)
Emission Limit	0.0010	0.0010	0.0006	0.14	2.11
Performance Test Result	0.00042	0.0007	0.0007	1.42	7.77

Table 1-8. CU06/ST07 and EU53 - March 2020 Test Results

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/ton gray iron)	CO (lb/ton gray iron) (lb/hr)
Emission Limit	0.0025	0.0025	0.0015	0.1	1 25.3
Performance Test Result	0.00091	0.0018	0.0018	0.11	0.086 1.24

Table 1-9. CU01/ST02 - June 2024 Test Results

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/hr)	CO (lb/hr)
Emission Limit	0.0010	0.0010	0.0006	0.14	2.11
Performance Test Result	0.0003	0.0005	0.0005	0.79	5.19

Table 1-10. CU06/ST07 - June 2024 Test Results

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/ton gray iron)	CO (lb/ton gray iron) (lb/hr)
Emission Limit	0.0025	0.0025	0.0015	0.1	1 25.3
Performance Test Result	0.00057	0.0006	0.0006	0.552	0.46 2.02

Table 1-11. CU08/ST09 - June 2024 Test Results

	PM	PM10	PM2.5	VOC	CO
Emission Limit	0.0025 gr/dscf 3.54 lb/hr	0.0025 gr/dscf 3.54 lb/hr	0.0015 gr/dscf 2.12 lb/hr	0.87 lb/ton gray iron 20.8 lb/hr	5.13 lb/ton gray iron 128 lb/hr
Performance Test Result	0.0003 gr/dscf 0.22 lb/hr	0.0005 gr/dscf 0.38 lb/hr	0.0005 gr/dscf 0.38 lb/hr	3.23 lb/ton gray iron 13.9 lb/hr	5.42 lb/ton gray iron 22.6 lb/hr

Table 1-12. Comparison of 2017 to 2025 Emissions Increase

Pollutant	PSD SER (tpy)	2017 Permit Modification		2025 Permit Revision	
		Emissions Increase (tpy)	PSD Permitting Required? (Yes/No)	Emissions Increase (tpy)	PSD Permitting Required? (Yes/No)
Filterable PM	25	43.3	Yes	28.54	Yes
PM_{10}	15	47.3	Yes	28.54	Yes
$PM_{2.5}$	10	30.9	Yes	28.54	Yes
SO_2	40	1.49	No	2.00	No
NO_x	40	28.5	No	15.68	No
VOC	40	79.1	No	223.54	Yes
CO	100	297	Yes	334.44	Yes
Lead	0.6	0.28	No	0.02	No

Table 1-13. Comparison of Current to 2022 and 2025 Proposed PM BACT

Control Device (Stack)	2017 PERMIT			2025 PROPOSED LIMITS			Comments on 2025 Proposed Limits
	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$	
CU01 (ST02)	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0006 gr/dscf 0.850 lb/hr 3.72 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	95th Upper CI all tests
CU06 (ST07)	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0015 gr/dscf 1.30 lb/hr 5.67 ton/yr	0.002 gr/dscf 1.75 lb/hr 7.67 ton/yr	0.002 gr/dscf 1.75 lb/hr 7.67 ton/yr	0.002 gr/dscf 1.75 lb/hr 7.67 ton/yr	95th Upper CI all tests
CU07 ST08				0.0005 gr/dscf 0.032 lb/hr 0.14 ton/yr	0.0005 gr/dscf 0.032 lb/hr 0.14 ton/yr	0.0005 gr/dscf 0.032 lb/hr 0.14 ton/yr	Only residual PM from Core Blower; Mixer vented to CU08
CU08 (ST09)	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0015 gr/dscf 2.12 lb/hr 9.30 ton/yr	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	95th Upper CI all tests
CU11 (ST12)	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0015 gr/dscf 0.792 lb/hr 3.47 ton/yr	0.001 gr/dscf 0.55 lb/hr 2.41 ton/yr	0.001 gr/dscf 0.55 lb/hr 2.41 ton/yr	0.001 gr/dscf 0.55 lb/hr 2.41 ton/yr	95th Upper CI all tests

Table 1-14. Comparison of Current to 2022 and 2025 Proposed VOC and CO BACT

Stack or Vent	2017 PERMIT		2025 PROPOSED LIMITS		Comments on 2025 Proposed Limits
	BACT for VOC	BACT for CO	BACT for VOC	BACT for CO	
CU01 ST02	0.013 lb/ton gray iron 0.14 lb/hr; 0.61 ton/yr	0.202 lb/ton gray iron 2.11 lb/hr; 9.25 ton/yr	0.247 lb/ton gray iron 9.48 lb/hr; 9.88 ton/yr	1.592 lb/ton gray iron 57.58 lb/hr; 63.68 ton/yr	95th Upper CI all tests
CU06 ST07 (Previously EU53)	0.10 lb/ton gray iron; 2.53 lb/hr 4.58 ton/yr	1.00 lb/ton gray iron; 25.3 lb/hr 45.79 ton/yr	0.616 lb/ton gray iron 9.24 lb/hr; 24.64 ton/yr	0.515 lb/ton gray iron 7.73 lb/hr; 20.60 ton/yr	95th Upper CI all tests
CU07 ST08	0.25 lb/ton core sand 0.70 lb/hr; 1.67 ton/yr	N/A	4.59 lb/ton core sand 8.39 lb/hr; 15.35 ton/yr	N/A	Vendor information and mass balance
CU08 ST09	0.87 lb/ton gray iron 20.8 lb/hr; 39.7 ton/yr	5.13 lb/ton gray iron 128 lb/hr; 235 ton/yr	3.561 lb/ton gray iron 54.70 lb/hr; 142.44 ton/yr	6.238 lb/ton gray iron 93.15 lb/hr; 249.52 ton/yr	95th Upper CI all tests

Table 2-1. Emission Unit Descriptions and Changes identifed in 2025 Air Permit Application

Emission Unit	Description	Requested Description Change	FWNA Comments
EU01	Scrap Steel Storage	Combine into single emission unit as identified as Charge Handling (EU01)	
EU02	Alloy Storage		
~~EU03~~	~~Scrap Drying~~	~~No Change~~	This unit will not be installed
~~EU04~~	~~Scrap Cleaning~~	~~No Change~~	This unit will not be installed
EU05	Refractory Burner #1	No Change	
EU06	Refractory Burner #2	No Change	
EU07	Induction Furnace #1	No Change	
EU08	Induction Furnace #2	No Change	
EU09	Induction Furnace #3	No Change	
EU10	Induction Furnace #4	No Change	
~~EU11~~	~~Holding Furnace #1~~	~~No Change~~	This unit will not be installed
~~EU12~~	~~Holding Furnace #2~~	~~No Change~~	This unit will not be installed
EU13	Transport Ladle #1	Combine into a single emission unit identified as Hot Metal Transfer (EU13)	
EU14	Transport Ladle #2		
EU15	Pouring Furnace #1	No Change	
~~EU16~~	~~Pouring Furnace #2~~	~~No Change~~	This unit will not be installed
EU17	Melt and Core/Mold Baghouse Waste Dust Silo	No Change	
EU18	Refractory Curing Mobile Burner	No Change	
EU19	Mold Silica Sand Silo	No Change	
EU20	Blend Silo	No Change	
EU21	Bentonite Silo	No Change	
EU22	Mold Silica Sand Bin	Combine into a single emission unit identified as Mold Sand Handling and Preparation (EU22)	
EU23	Blend Bin		
EU24	Bentonite Bin		
EU26	Mold Silica Sand Weigh Hopper		
EU27	Blend Weigh Hopper		
EU28	Bentonite Weigh Hopper		
EU29	Dust Weigh Hopper		
EU30	Green Sand Mixer #1		
EU31	Green Sand Mixer #2		
EU32	Green Sand Mixer #3		
EU33	Mold Stamping #1	Mold Making #1	
~~EU34~~	~~Mold Stamping #2~~	~~Mold Making #2~~	This unit will not be installed
EU35A	Core Silica Sand Silo A	No Change	
EU35B	Core Silica Sand Silo B	No Change	
EU36	Sand Classifier	Combine into a single emission unit identified as Core Sand Handling and Preparation (EU36)	
EU37	Core Silica Sand Bin		
EU38	Core Silica Sand Weigh Hopper		
EU39	Core Machine #1	PUCB Core Machine #1	
EU40	Core Machine #2	PUCB Core Machine #2	
~~EU41~~	~~Core Machine #3~~	~~PUCB Core Machine #3~~	This unit will not be installed
~~EU42~~	~~Core Machine #4~~	~~PUCB Core Machine #4~~	This unit will not be installed

EU43	Core Removal	Core Wash Station #1	
EU44	Dryer #1	Core Dryer #1	
EU45	Dryer #2	Core Dryer #2	
~~EU46~~	~~Dryer #3~~	~~Core Dryer #3~~	This unit will not be installed
~~EU47~~	~~Dryer #4~~	~~Core Dryer #4~~	This unit will not be installed
EU48	Mold Assembly #1	Combine into Mold Making #1 (EU33)	
~~EU49~~	~~Mold Assembly #2~~	~~Combine into Mold Making #2 (EU34)~~	This unit will not be installed
EU50	Pouring #1	No Change	
~~EU51~~	~~Pouring #2~~	~~No Change~~	This unit will not be installed
EU52	Cooling Tunnel	Mold Cooling	
EU53	Shakeout Conveyor	No Change	
EU54	Sand Cooler	Combine into a single emission unit identified as Mold Sand Handling and Preparation (EU22)	
EU55	Used Mold & Core Sand Storage	Combine into a single emission unit identified as Mold Sand Handling and Preparation (EU22)	
EU56	Sand Screening	Combine into a single emission unit identified as Mold Sand Handling and Preparation (EU22)	
EU57	Sand Plant Waste Sand Silo	No Change	
~~EU58~~	~~Mold Shop Baghouse Waste Dust Silo~~	~~No Change~~	This unit will not be installed
EU59	Forced Air Cooler	Casting Cooling	
EU60	Sorting	Sorting Conveyor	
EU61	Steel Shot Blasting #1	No Change	
~~EU62~~	~~Steel Shot Blasting #2~~	~~No Change~~	This unit will not be installed
EU63	Fettling Baghouse Waste Dust Silo	No Change	
EU64	Grinding #1	Auto Grinding #1	
EU65	Grinding #2	Auto Grinding #2	
EU66	Turning Lathes (8)	Machining Lines (9)	
EU67	Perforation Line #2	Perforation Line #2	
EU68	Paint Booth #1	Paint Line #3	
EU69	Paint Booth #2	Paint Line #2	
~~EU70~~	~~Paint Booth #3~~	~~Paint Line #4~~	This unit will not be installed
EU71	Paint Booth #4	Paint Line #1	
EU72	Emergency Generator #1	No Change	
EU73	Emergency Generator #2	No Change	
EU74	Emergency Generator #3	No Change	
~~EU75~~	~~Gasoline Storage Tank~~	~~No Change~~	This unit will not be installed
EU75	Diesel Storage Tank	No Change	
EU76	Paved Roads	No Change	
EU77	Snag Grinder #1	Addition	Emission unit may not be identified in existing Air Permit.
EU78	Snag Grinder #2	Addition	Emission unit may not be identified in existing Air Permit.
EU79	Core Wash Station #2	Addition	Included in existing air permit as EU43 but broken out as it functions as a discrete emission unit.
~~EU80~~	~~Core Wash Station #3~~	~~Addition~~	This unit will not be installed
~~EU81~~	~~Core Wash Station #4~~	~~Addition~~	This unit will not be installed
EU82	Rust Preventative Application	Addition	Emission unit may not be identified in existing Air Permit.
EU83	Rotary Sprue Cleaner and Conveyors	Addition	Permit application previously submitted
EU84	Perforation Line #1	Perforation Line #1	

Table 2-2. Control Device, Stack and Emission Unit ID Number Cross Reference

Control Device ID	Stack ID	Control Device and Stack Description	Emission Unit #1	Emission Unit #2	Emission Unit #3	Emission Unit #4	Emission Unit #5	Emission Unit #6	Emission Unit #7	Emission Unit #8	Emission Unit #9	Emission Unit #10	Emission Unit #11	Emission Unit #12	Emission Unit #13	Emission Unit #14	Emission Unit #15	Emission Unit #16	Emission Unit #17	Emission Unit #18	Emission Unit #19	Emission Unit #20	Emission Unit #21	Emission Unit #22
CU01	ST02	Melt Baghouse	EU01	EU02	~~EU03~~	~~EU04~~	EU05	EU06	EU07	EU08	EU09	EU10	~~EU11~~	~~EU12~~	EU13	EU14	EU15	~~EU16~~	EU18					
CU02	ST03	Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent	EU17																					
CU03	ST04	Mold Silica Sand Silo Bin Vent Filter	EU19																					
CU04	ST05	Blend Silo Bin Vent Filter	EU20																					
CU05	ST06	Bentonite Silo Bin Vent Filter	EU21																					
CU06	ST07	Sand Plant Baghouse	EU22	EU23	EU24	EU26	EU27	EU28	EU29	EU30	EU31	EU32	EU53	EU54	EU55	EU56								
CU07	ST08	Acid Scrubber	EU39 (Blower)	EU40 (Blower)	~~EU41~~	~~EU42~~																		
CU08	ST09	Core/Mold Baghouse	EU33	~~EU34~~	EU36	EU37	EU38	EU39 (Mixer)	EU40 (Mixer)	EU43	EU44	EU45	~~EU46~~	~~EU47~~	EU48	~~EU49~~	EU50	~~EU51~~	EU52	EU59	EU79	~~EU80~~	~~EU81~~	EU83
~~CU09~~	~~ST10~~	~~Core/Mold Baghouse Waste Dust Silo Bin Vent Filter~~	~~EU58~~																					
CU10	ST11	Sand Plant Baghouse Waste Sand Silo Bin Vent Filter	EU57																					
CU11	ST12	Fettling Baghouse	EU60	EU61	~~EU62~~	EU64	EU65	EU83																
CU12	ST13	Fettling Baghouse Waste Dust Silo Bin Vent Filter	EU63																					
CU13a-CU13h	ST16	Machining Lines Cartridge Collectors	EU66																					
CU13j	ST16	Perforation Line #2 Cartridge Collector	EU67																					
CU13i	ST16	Perforation Line #1 Cartridge Collector	EU84																					
CU14	ST15A	Paint Line #3 Booth Filter	EU68																					
CU15	ST15B	Paint Line #2 Booth Filter	EU69																					
CU16	ST15C	~~Paint Line #4 Booth Filter~~	~~EU70~~																					
CU17	ST16	Paint Line #1 Booth Filter	EU71	EU82																				
CU19	ST09	Core Silica Sand Silo A Bin Vent Filter	EU35A																					
CU20	ST09	Core Silica Sand Silo B Bin Vent Filter	EU35B																					
NA	STG1	Emergency Generator #1	EU72																					
NA	STG2	Emergency Generator #2	EU73																					
NA	STG3	Emergency Generator #3	EU74																					
NA	STTK1	~~Gasoline Storage Tank Vent~~	~~EU75~~																					
NA	STTK1	Diesel Storage Tank Vent	EU75																					
NA	FUG	Paved Roadways	EU76																					
CU21	ST12	Snag Grinder #1 Fabric Filter	EU77																					
CU22	ST12	Snag Grinder #2 Fabric Filter	EU78																					

Denotes secondary capture of emissions

Denotes emissions from control device are captured and vented out an alternative control device stack (EU66/EU67/EU84 via ST16; EU35A/EU35B via ST09; EU77/EU78 via ST12)

Denotes emission unit is combined with another existing emission unit with CY2025 air permit application

Denotes emission unit vents to two different air pollution control devices

~~strikethrough~~ Denotes emission unit, air pollution control device and/or stack will not be installed

Table 2-3. Control Device, Stack and Emission Unit Description Cross Reference

Stack ID	Control Device and Stack Description	Emission Unit #1	Emission Unit #2	Emission Unit #3	Emission Unit #4	Emission Unit #5	Emission Unit #6	Emission Unit #7	Emission Unit #8	Emission Unit #9	Emission Unit #10	Emission Unit #11	Emission Unit #12	Emission Unit #13	Emission Unit #14	Emission Unit #15	Emission Unit #16	Emission Unit #17	Emission Unit #18	Emission Unit #19	Emission Unit #20	Emission Unit #21	Emission Unit #22
ST02	Melt Baghouse	Scrap Steel Storage	Alloy Storage	~~Scrap Drying~~	~~Scrap Cleaning~~	Refractory Burner #1	Refractory Burner #2	Induction Furnace #1	Induction Furnace #2	Induction Furnace #3	Induction Furnace #4	~~Holding Furnace #1~~	~~Holding Furnace #2~~	Transport Ladle #1	Transport Ladle #2	Pouring Furnace #1	~~Pouring Furnace #2~~	Refractory Curing Mobile Burner					
ST03	Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent	Melt Shop Baghouse Waste Dust Silo																					
ST04	Mold Silica Sand Silo Bin Vent Filter	Mold Silica Sand Silo																					
ST05	Blend Silo Bin Vent Filter	Blend Silo																					
ST06	Bentonite Silo Bin Vent Filter	Bentonite Silo																					
ST07	Sand Plant Baghouse	Mold Silica Sand Bin	Blend Bin	Bentonite Bin	Mold Silica Sand Weigh Hopper	Blend Weigh Hopper	Bentonite Weigh Hopper	Dust Weigh Hopper	Green Sand Mixer #1	Green Sand Mixer #2	Green Sand Mixer #3	Shakeout Conveyor	Sand Cooler	Used Mold & Core Sand Storage	Sand Screening								
ST08	Acid Scrubber	PUCB Core Machine #1 (Blower)	Machine #2 (Blower)	~~PUCB Core Machine #3~~	~~PUCB Core Machine #4~~																		
ST09	Core/Mold Baghouse	Mold Making #1	~~Mold Making #2~~	Sand Classifier	Core Silica Sand Bin	Core Silica Sand Weigh Hopper	PUCB Core Machine #1 (Mixer)	PUCB Core Machine #2 (Mixer)	Core Wash Station #1	Core Dryer #1	Core Dryer #2	~~Core Dryer #3~~	~~Core Dryer #4~~	Mold Assembly #1	~~Mold Assembly #2~~	Pouring #1	~~Pouring #2~~	Mold Cooling	Casting Cooling	Core Wash Station #2	~~Core Wash Station #3~~	~~Core Wash Station #4~~	Rotary Sprue Cleaner and Conveyors
~~ST10~~	~~Core/Mold Baghouse Waste Dust Silo Bin Vent Filter~~	~~Mold Shop Baghouse Waste Dust Silo~~																					
ST11	Sand Plant Baghouse Waste Sand Silo Bin Vent Filter	Sand Plant Waste Sand Silo																					
ST12	Fettling Baghouse	Sorting Conveyor	Steel Shot Blasting #1	~~Steel Shot Blasting #2~~	Auto Grinding #1	Auto Grinding #2	Rotary Sprue Cleaner and Conveyors																
ST13	Fettling Baghouse Waste Dust Silo Bin Vent Filter	Fettling Baghouse Waste Dust Silo																					
ST16	Machining Cartridge Collectors	Machining Lines (9)																					
ST16	Perforation Line #2 Cartridge Collector	Perforation Line #2																					
ST16	Perforation Line #1 Cartridge Collector	Perforation Line #1																					
ST15A	Paint Line #3 Booth Filter	Paint Line #3																					
ST15B	Paint Line #2 Booth Filter	Paint Line #2																					
~~ST15C~~	~~Paint Line #4 Booth Filter~~	~~Paint Line #4~~																					
ST16	Paint Line #1 Booth Filter	Paint Line #1	Rust Preventative Application																				
ST09	Core Silica Sand Silo A Bin Vent Filter	Core Silica Sand Silo A																					
ST09	Core Silica Sand Silo B Bin Vent Filter	Core Silica Sand Silo B																					
STG1	Emergency Generator #1	Emergency Generator #1																					
STG2	Emergency Generator #2	Emergency Generator #2																					
STG3	Emergency Generator #3	Emergency Generator #3																					
~~STTK-1~~	~~Gasoline Storage Tank Vent~~	~~Gasoline Storage Tank~~																					
STTK-1	Diesel Storage Tank Vent	Diesel Storage Tank																					
FUG	Paved Roadways	Paved Roadways																					
ST12	Snag Grinder #1 Fabric Filter	Snag Grinder #1																					
ST12	Snag Grinder #2 Fabric Filter	Snag Grinder #2																					

Denotes secondary capture of emissions

Denotes emissions from control device are captured and vented out an alternative control device stack (EU66/EU67/EU84 via ST16; EU35A/EU35B via ST09; EU77/EU78 via ST12)

Denotes emission unit is combined with another existing emission unit with CY2025 air permit application

Denotes emission unit vents to two different air pollution control devices

~~strikethrough~~ Denotes emission unit, air pollution control device and/or stack will not be installed

Table 3-1. Hourly Emission Calculations

PROCESS	EU ID	Stack ID	Emissions Estimates - PSD Regulated Pollutants (lbs/hr) PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO2e	
Charge Handling	EU01	ST02										Note 1
Refractory Burner #1	EU05	ST02				0.005	0.833	0.046	0.700	0.000	1000.000	Note 1,5
Refractory Burner #2	EU06	ST02				0.005	0.833	0.046	0.700	0.000	1000.000	Note 1,5
Induction Furnace #1	EU07	ST02						2.341	13.944			Note 1,5
Induction Furnace #2	EU08	ST02						2.341	13.944			Note 1,5
Induction Furnace #3	EU09	ST02						2.341	13.944			Note 1,5
Induction Furnace #4	EU10	ST02						2.341	13.944			Note 1,5
Hot Metal Transfer	EU13	ST02										Note 1
Pouring Furnace #1	EU15	ST02				*0.002*	*0.285*	*0.016*	*0.240*	*0.000*	*342.353*	Note 1,5
Melt and Core/Mold Baghouse Dust Silo	EU17	ST03										Note 1
Refractory Curing Mobile Burner	EU18	ST02				*0.001*	*0.196*	*0.011*	*0.165*	*0.000*	*235.294*	Note 1,5
Mold Silica Sand Silo	EU19	ST04										Note 1
Blend Silo	EU20	ST05										Note 1
Bentonite Silo	EU21	ST06										Note 1
Mold Sand Handling and Preparation	EU22	ST07										Note 1
Mold Making #1	EU33	ST09										Note 1
Core Silica Sand Silo A	EU35A	ST09										Note 6
Core Silica Sand Silo B	EU35B	ST09										Note 6
Core Sand Handling and Preparation	EU36	ST09										Note 1
PUCB Core Machine #1(Resin)	EU39	ST09						0.104				Note 1,5
PUCB Core Machine #1(Resin+Cat)	EU39	ST08						0.624				Note 1,5
PUCB Core Machine #1 (Core Release)	EU39	ST08						3.570				Note 5
PUCB Core Machine #2(Resin)	EU40	ST09						0.104				Note 1,5
PUCB Core Machine #2(Resin+Cat)	EU40	ST08						0.624				Note 1,5
PUCB Core Machine #2 (Core Release)	EU40	ST08						3.570				Note 5
Core Wash Station #1	EU43	ST09						*0.675*				Note 5
Core Dryer #1	EU44	ST09				*0.002*	*0.392*	*0.022*	*0.329*	*0.000*	*470.588*	Note 1,5
Core Dryer #2	EU45	ST09				*0.002*	*0.392*	*0.022*	*0.329*	*0.000*	*470.588*	Note 1,5
Pouring #1	EU50	ST09				*0.300*	*0.150*	*53.101*	*92.488*	*0.007*		Note 1,5
Mold Cooling	EU52	ST09										
Shakeout Conveyor	EU53	ST07						*9.240*	*7.725*			Note 1,5
Sand Plant Waste Sand Silo	EU57	ST11										Note 1
Casting Cooling	EU59	ST09										Note 1
Sorting Conveyor	EU60	ST12										Note 1
Steel Shot Blasting #1	EU61	ST12										Note 1
Fettling Baghouse Waste Dust Silo	EU63	ST13										Note 1
Auto Grinding #1	EU64	ST12										Note 1
Auto Grinding #2	EU65	ST12										Note 1
Machining Lines (9)	EU66	ST16										Note 6
Perforation Line #2	EU67	ST16										Note 6
Paint Line #3 (Coating)	EU68	ST15A						*2.430*				Note 1,5
Paint Line #3 (Thinner)	EU68	ST15A						*1.000*				Note 5
Paint Line #2(Coating)	EU69	ST15B						*2.430*				Note 1,5
Paint Line #2(Thinner)	EU69	ST15B						*1.000*				Note 5
Paint Line #1	EU71	ST16						*0.992*				Note 1,5
Emergency Generator #1	EU72	STG1	*5.12E-01*	*5.12E-01*	*5.12E-01*	*1.11E+01*	*2.35E+01*	*6.62E-01*	*6.25E+00*		*1.21E+03*	
Emergency Generator #2	EU73	STG2	*5.12E-01*	*5.12E-01*	*5.12E-01*	*1.12E+01*	*2.35E+01*	*6.62E-01*	*6.25E+00*		*1.21E+03*	
Emergency Generator #3	EU74	STG3	*1.22E-01*	*1.22E-01*	*1.22E-01*	*1.14E-01*	*1.73E+00*	*1.37E-01*	*3.72E-01*		*6.43E+01*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Snag Grinder #1	EU77	ST12										Note 6
Snag Grinder #2	EU78	ST12										Note 6
Core Wash Station #2	EU79	ST09						*0.675*				Note 5
Rust Prohibitive Application	EU82	ST16						*2.500*				Note 5
Rotary Sprue Cleaner and Conveyors	EU83	ST12										Note 1,4
Perforation Line #1	EU84	ST16										Note 6
Total Emissions			**1.15**	**1.15**	**1.15**	**22.74**	**51.85**	**94.54**	**171.32**	**0.01**	**6008.61**	Note 3
Melt Baghouse (CU01)	CU01	ST02	1.982	1.982	1.982	0.013	2.148	9.481	57.581	0.000	2577.647	
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)	CU02	ST03	0.015	0.015	0.015							
Mold Silica Sand Silo Bin Vent Filter (CU03)	CU03	ST04	0.015	0.015	0.015							
Blend Silo Bin Vent Filter (CU04)	CU04	ST05	0.015	0.015	0.015							
Bentonite Silo Bin Vent Filter (CU05)	CU05	ST06	0.015	0.015	0.015							
Sand Plant Baghouse (CU06)	CU06	ST07	1.750	1.750	1.750			9.240	7.725			
Acid Scrubber (CU07)	CU07	ST08	0.032	0.032	0.032			8.388				
Core/Mold Baghouse (CU08)	CU08	ST09	1.425	1.425	1.425	0.305	0.934	54.703	93.147	0.007	941.176	
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)	CU10	ST11	*0.015*	*0.015*	*0.015*							
Fettling Baghouse (CU11)	CU11	ST12	0.552	0.552	0.552							
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)	CU12	ST13	0.015	0.015	0.015							
Machining Cartridge Collectors (CU13a-h)	CU13a-h	ST16	0.101	0.101	0.101							Note 2
Perforation Line #2 Cartridge Collector (CU13j)	CU13j	ST16	0.050	0.050	0.050							Note 2
Perforation Line #1 Cartridge Collector (CU13i)	CU13i	ST16	0.050	0.050	0.050							Note 2
Paint Line #3 Booth Filter (CU14)	CU14	ST15A	0.064	0.064	0.064			3.430				
Paint Line #2 Booth Filter (CU15)	CU15	ST15B	0.064	0.064	0.064			3.430				
Paint Line #1 Booth Filter (CU17)	CU17	ST16	0.587	0.587	0.587			3.492				
Core Silica Sand Silo A Bin Vent Filter (CU19)	CU19	ST09	0.015	0.015	0.015							Note 2
Core Silica Sand Silo B Bin Vent Filter (CU20)	CU20	ST09	0.015	0.015	0.015							Note 2
Snag Grinder #1 Fabric Filter (CU21)	CU21	ST12	0.039	0.039	0.039							Note 2
Snag Grinder #2 Fabric Filter (CU22)	CU22	ST12	0.039	0.039	0.039							Note 2
Emergency Generator #1	EU72	STG1	*5.12E-01*	*5.12E-01*	*5.12E-01*	*1.11E+01*	*2.35E+01*	*6.62E-01*	*6.25E+00*		*1.21E+03*	
Emergency Generator #2	EU73	STG2	*5.12E-01*	*5.12E-01*	*5.12E-01*	*1.12E+01*	*2.35E+01*	*6.62E-01*	*6.25E+00*		*1.21E+03*	
Emergency Generator #3	EU74	STG3	*1.22E-01*	*1.22E-01*	*1.22E-01*	*1.14E-01*	*1.73E+00*	*1.37E-01*	*3.72E-01*		*6.43E+01*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Total Emissions			**6.55**	**6.55**	**6.55**	**0.32**	**3.08**	**93.08**	**158.45**	**0.01**	**3518.82**	Note 3

Note 1: PM, PM_{10} and $PM_{2.5}$ emissions are included in the emissions from the air pollution control device vented to the identified stack.

Note 2: Emissions from this air pollution control device are emitted inside the facility and assumed captured via a second air pollution control device associated with the identified stack.

Table 3-2. Annual Emission Calculations

PROCESS	EU ID	Stack ID	Emissions Estimates - PSD Regulated Pollutants (Tons/Year) PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO2e	
Charge Handling	EU01	ST02										Note 1
Refractory Burner #1	EU05	ST02				0.022	3.650	0.201	3.066	1.83E-05	4380.000	Note 1,5
Refractory Burner #2	EU06	ST02				0.022	3.650	0.201	3.066	1.83E-05	4380.000	Note 1,5
Induction Furnace #1	EU07	ST02						2.341	13.944			Note 1,5
Induction Furnace #2	EU08	ST02						2.341	13.944			Note 1,5
Induction Furnace #3	EU09	ST02						2.341	13.944			Note 1,5
Induction Furnace #4	EU10	ST02						2.341	13.944			Note 1,5
Hot Metal Transfer	EU13	ST02										Note 1
Pouring Furnace #1	EU15	ST02				*0.007*	*1.250*	*0.069*	*1.050*	*6.25E-06*	*1499.506*	Note 1,5
Melt and Core/Mold Baghouse Dust Silo	EU17	ST03										Note 1
Refractory Curing Mobile Burner	EU18	ST02				*0.005*	*0.859*	*0.047*	*0.721*	*4.29E-06*	*1030.588*	Note 1,5
Mold Silica Sand Silo	EU19	ST04										Note 1
Blend Silo	EU20	ST05										Note 1
Bentonite Silo	EU21	ST06										Note 1
Mold Sand Handling and Preparation	EU22	ST07										Note 1
Mold Making #1	EU33	ST09										Note 1
Core Silica Sand Silo A	EU35A	ST09										Note 6
Core Silica Sand Silo B	EU35B	ST09										Note 6
Core Sand Handling and Preparation	EU36	ST09										Note 1
PUCB Core Machine #1(Resin)	EU39	ST09						0.189				Note 1,5
PUCB Core Machine #1(Resin+Cat)	EU39	ST08						1.128				Note 1,5
PUCB Core Machine #1 (Core Release)	EU39	ST08						6.545				Note 5
PUCB Core Machine #2(Resin)	EU40	ST09						0.189				Note 1,5
PUCB Core Machine #2(Resin+Cat)	EU40	ST08						*1.128*				Note 1,5
PUCB Core Machine #2 (Core Release)	EU40	ST08						*6.545*				Note 5
Core Wash Station #1	EU43	ST09						*0.135*				Note 5
Core Dryer #1	EU44	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2061.176*	Note 1,5
Core Dryer #2	EU45	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2061.176*	Note 1,5
Pouring #1	EU50	ST09				*0.800*	*0.400*	*141.604*	*246.634*	*1.92E-02*		Note 1,5
Mold Cooling	EU52	ST09										
Shakeout Conveyor	EU53	ST07						*24.640*	*20.600*			Note 1,5
Sand Plant Waste Sand Silo	EU57	ST11										Note 1
Casting Cooling	EU59	ST09										Note 1
Sorting Conveyor	EU60	ST12										Note 1
Steel Shot Blasting #1	EU61	ST12										Note 1
Fettling Baghouse Waste Dust Silo	EU63	ST13										Note 1
Auto Grinding #1	EU64	ST12										Note 1
Auto Grinding #2	EU65	ST12										Note 1
Machining Lines (9)	EU66	ST16										Note 6
Perforation Line #2	EU67	ST16										Note 6
Paint Line #3 (Coating)	EU68	ST15A						9.720				Note 1,5
Paint Line #3 (Thinner)	EU68	ST15A						4.000				Note 5
Paint Line #2(Coating)	EU69	ST15B						*9.720*				Note 1,5
Paint Line #2(Thinner)	EU69	ST15B						*4.000*				Note 5
Paint Line #1	EU71	ST16						*1.804*				Note 1,5
Emergency Generator #1	EU72	STG1	*2.56E-02*	*2.56E-02*	*2.56E-02*	*5.57E-01*	*1.18E+00*	*3.31E-02*	*3.12E-01*		*6.06E+01*	
Emergency Generator #2	EU73	STG2	*2.56E-02*	*2.56E-02*	*2.56E-02*	*5.59E-01*	*1.18E+00*	*3.31E-02*	*3.12E-01*		*6.06E+01*	
Emergency Generator #3	EU74	STG3	*6.08E-03*	*6.08E-03*	*6.08E-03*	*5.68E-03*	*8.64E-02*	*6.86E-03*	*1.86E-02*		*3.21E+00*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Snag Grinder #1	EU77	ST12										Note 6
Snag Grinder #2	EU78	ST12										Note 6
Core Wash Station #2	EU79	ST09						*0.135*				Note 5
Rust Prohibitive Application	EU82	ST16						*1.000*				Note 5
Rotary Sprue Cleaner and Conveyors	EU83	ST12										Note 1,4
Perforation Line #1	EU84	ST16										Note 6
Total Emissions			**0.06**	**0.06**	**0.06**	**2.00**	**15.68**	**223.54**	**334.44**	**0.02**	**15536.94**	Note 3
Melt Baghouse (CU01)	CU01	ST02	*8.683*	*8.683*	*8.683*	*0.056*	*9.408*	*9.880*	*63.680*	*4.70E-05*	*11290.094*	
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)	CU02	ST03	*0.068*	*0.068*	*0.068*							
Mold Silica Sand Silo Bin Vent Filter (CU03)	CU03	ST04	*0.0010*	*0.0010*	*0.0010*							
Blend Silo Bin Vent Filter (CU04)	CU04	ST05	*0.0010*	*0.0010*	*0.0010*							
Bentonite Silo Bin Vent Filter (CU05)	CU05	ST06	*0.0010*	*0.0010*	*0.0010*							
Sand Plant Baghouse (CU06)	CU06	ST07	*7.667*	*7.667*	*7.667*			*24.640*	*20.600*			
Acid Scrubber (CU07)	CU07	ST08	*0.138*	*0.138*	*0.138*			*15.346*				
Core/Mold Baghouse (CU08)	CU08	ST09	*6.241*	*6.241*	*6.241*	*0.821*	*3.835*	*142.440*	*249.520*	*0.019*	*4122.353*	
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)	CU10	ST11	*0.068*	*0.068*	*0.068*							
Fettling Baghouse (CU11)	CU11	ST12	*2.417*	*2.417*	*2.417*							
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)	CU12	ST13	*0.068*	*0.068*	*0.068*							
Machining Cartridge Collectors (CU13a-h)	CU13a-h	ST16	*0.442*	*0.442*	*0.442*							Note 2
Perforation Line #2 Cartridge Collector (CU13j)	CU13j	ST16	*0.221*	*0.221*	*0.221*							Note 2
Perforation Line #1 Cartridge Collector (CU13i)	CU13i	ST16	*0.221*	*0.221*	*0.221*							Note 2
Paint Line #3 Booth Filter (CU14)	CU14	ST15A	*0.279*	*0.279*	*0.279*			*13.720*				
Paint Line #2 Booth Filter (CU15)	CU15	ST15B	*0.279*	*0.279*	*0.279*			*13.720*				
Paint Line #1 Booth Filter (CU17)	CU17	ST16	*2.572*	*2.572*	*2.572*			*2.804*				
Core Silica Sand Silo A Bin Vent Filter (CU19)	CU19	ST09	*0.001*	*0.001*	*0.001*							Note 2
Core Silica Sand Silo B Bin Vent Filter (CU20)	CU20	ST09	*0.001*	*0.001*	*0.001*							Note 2
Snag Grinder #1 Fabric Filter (CU21)	CU21	ST12	*0.169*	*0.169*	*0.169*							Note 2
Snag Grinder #2 Fabric Filter (CU22)	CU22	ST12	*0.169*	*0.169*	*0.169*							Note 2
Emergency Generator #1	EU72	STG1	*2.56E-02*	*2.56E-02*	*2.56E-02*	*5.57E-01*	*1.18E+00*	*3.31E-02*	*3.12E-01*		*6.06E+01*	
Emergency Generator #2	EU73	STG2	*2.56E-02*	*2.56E-02*	*2.56E-02*	*5.59E-01*	*1.18E+00*	*3.31E-02*	*3.12E-01*		*6.06E+01*	
Emergency Generator #3	EU74	STG3	*6.08E-03*	*6.08E-03*	*6.08E-03*	*5.68E-03*	*8.64E-02*	*6.86E-03*	*1.86E-02*		*3.21E+00*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Total Emissions			**28.48**	**28.48**	**28.48**	**0.88**	**13.24**	**223.47**	**333.80**	**0.02**	**15412.45**	Note 3

Note 1: PM, PM_{10} and $PM_{2.5}$ emissions are included in the emissions from the air pollution control device vented to the identified stack.

Note 2: Emissions from this air pollution control device are emitted inside the facility and assumed captured via a second air pollution control device associated with the identified stack. "Total Emissions" do not include these units but are assumed to be a portion of the emissions associated with the stack of the secondary air pollution control device.

Note 3: "Total Emissions" do not include the emissions from the emergency generators.

Note 4: Emissions are captured by CU08 and CU11; emissions assigned to CU11 for worksheet construction.

Note 5: Non-PM criteria pollutant emissions are summed to their referenced stack in the table below.

Note 6: The air pollution control device associated with the unit emit indoors and exhaust via the identified stack.

Table 5-1. Project Emissions Increase

Pollutant	PSD SER (tpy)	2025 Permit Revision	
		Emissions Increase (tpy)	PSD Permitting Required? (Yes/No)
Filterable PM	25	28.54	Yes
PM_{10}	15	28.54	Yes
$PM_{2.5}$	10	28.54	Yes
SO_2	40	2.00	No
NO_x	40	15.68	No
VOC	40	223.54	Yes
CO	100	334.44	Yes
Lead	0.6	0.02	No

Table 5-2. Annual Emission Calculations

PROCESS	EU ID	Stack ID	Emissions Estimates - PSD Regulated Pollutants (Tons/Year) PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO2e	
Charge Handling	EU01	ST02										Note 1
Refractory Burner #1	EU05	ST02				0.022	3.650	0.201	3.066	1.83E-05	4380.000	Note 1,5
Refractory Burner #2	EU06	ST02				0.022	3.650	0.201	3.066	1.83E-05	4380.000	Note 1,5
Induction Furnace #1	EU07	ST02						2.341	13.944			Note 1,5
Induction Furnace #2	EU08	ST02						2.341	13.944			Note 1,5
Induction Furnace #3	EU09	ST02						2.341	13.944			Note 1,5
Induction Furnace #4	EU10	ST02						2.341	13.944			Note 1,5
Hot Metal Transfer	EU13	ST02										Note 1
Pouring Furnace #1	EU15	ST02				*0.007*	*1.250*	*0.069*	*1.050*	*6.25E-06*	*1499.506*	Note 1,5
Melt and Core/Mold Baghouse Dust Silo	EU17	ST03										Note 1
Refractory Curing Mobile Burner	EU18	ST02				*0.005*	*0.859*	*0.047*	*0.721*	*4.29E-06*	*1030.588*	Note 1,5
Mold Silica Sand Silo	EU19	ST04										Note 1
Blend Silo	EU20	ST05										Note 1
Bentonite Silo	EU21	ST06										Note 1
Mold Sand Handling and Preparation	EU22	ST07										Note 1
Mold Making #1	EU33	ST09										Note 1
Core Silica Sand Silo A	EU35A	ST09										Note 6
Core Silica Sand Silo B	EU35B	ST09										Note 6
Core Sand Handling and Preparation	EU36	ST09										Note 1
PUCB Core Machine #1(Resin)	EU39	ST09						0.189				Note 1,5
PUCB Core Machine #1(Resin+Cat)	EU39	ST08						1.128				Note 1,5
PUCB Core Machine #1 (Core Release)	EU39	ST08						6.545				Note 5
PUCB Core Machine #2(Resin)	EU40	ST09						0.189				Note 1,5
PUCB Core Machine #2(Resin+Cat)	EU40	ST08						*1.128*				Note 1,5
PUCB Core Machine #2 (Core Release)	EU40	ST08						*6.545*				Note 5
Core Wash Station #1	EU43	ST09						*0.135*				Note 5
Core Dryer #1	EU44	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2061.176*	Note 1,5
Core Dryer #2	EU45	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2061.176*	Note 1,5
Pouring #1	EU50	ST09				*0.800*	*0.400*	*141.604*	*246.634*	*1.92E-02*		Note 1,5
Mold Cooling	EU52	ST09										
Shakeout Conveyor	EU53	ST07						*24.640*	*20.600*			Note 1,5
Sand Plant Waste Sand Silo	EU57	ST11										Note 1
Casting Cooling	EU59	ST09										Note 1
Sorting Conveyor	EU60	ST12										Note 1
Steel Shot Blasting #1	EU61	ST12										Note 1
Fettling Baghouse Waste Dust Silo	EU63	ST13										Note 1
Auto Grinding #1	EU64	ST12										Note 1
Auto Grinding #2	EU65	ST12										Note 1
Machining Lines (9)	EU66	ST16										Note 6
Perforation Line #2	EU67	ST16										Note 6
Paint Line #3 (Coating)	EU68	ST15A						9.720				Note 1,5
Paint Line #3 (Thinner)	EU68	ST15A						4.000				Note 5
Paint Line #2(Coating)	EU69	ST15B						*9.720*				Note 1,5
Paint Line #2(Thinner)	EU69	ST15B						*4.000*				Note 5
Paint Line #1	EU71	ST16						*1.804*				Note 1,5
Emergency Generator #1	EU72	STG1	*2.56E-02*	*2.56E-02*	*2.56E-02*	*5.57E-01*	*1.18E+00*	*3.31E-02*	*3.12E-01*		*6.06E+01*	
Emergency Generator #2	EU73	STG2	*2.56E-02*	*2.56E-02*	*2.56E-02*	*5.59E-01*	*1.18E+00*	*3.31E-02*	*3.12E-01*		*6.06E+01*	
Emergency Generator #3	EU74	STG3	*6.08E-03*	*6.08E-03*	*6.08E-03*	*5.68E-03*	*8.64E-02*	*6.86E-03*	*1.86E-02*		*3.21E+00*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Snag Grinder #1	EU77	ST12										Note 6
Snag Grinder #2	EU78	ST12										Note 6
Core Wash Station #2	EU79	ST09						*0.135*				Note 5
Rust Prohibitive Application	EU82	ST16						*1.000*				Note 5
Rotary Sprue Cleaner and Conveyors	EU83	ST12										Note 1,4
Perforation Line #1	EU84	ST16										Note 6
Total Emissions			**0.06**	**0.06**	**0.06**	**2.00**	**15.68**	**223.54**	**334.44**	**0.02**	**15536.94**	Note 3
Melt Baghouse (CU01)	CU01	ST02	*8.683*	*8.683*	*8.683*	*0.056*	*9.408*	*9.880*	*63.680*	*4.70E-05*	*11290.094*	
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)	CU02	ST03	*0.068*	*0.068*	*0.068*							
Mold Silica Sand Silo Bin Vent Filter (CU03)	CU03	ST04	*0.0010*	*0.0010*	*0.0010*							
Blend Silo Bin Vent Filter (CU04)	CU04	ST05	*0.0010*	*0.0010*	*0.0010*							
Bentonite Silo Bin Vent Filter (CU05)	CU05	ST06	*0.0010*	*0.0010*	*0.0010*							
Sand Plant Baghouse (CU06)	CU06	ST07	*7.667*	*7.667*	*7.667*			*24.640*	*20.600*			
Acid Scrubber (CU07)	CU07	ST08	*0.138*	*0.138*	*0.138*			*15.346*				
Core/Mold Baghouse (CU08)	CU08	ST09	*6.241*	*6.241*	*6.241*	*0.821*	*3.835*	*142.440*	*249.520*	*0.019*	*4122.353*	
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)	CU10	ST11	*0.068*	*0.068*	*0.068*							
Fettling Baghouse (CU11)	CU11	ST12	*2.417*	*2.417*	*2.417*							
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)	CU12	ST13	*0.068*	*0.068*	*0.068*							
Machining Cartridge Collectors (CU13a-h)	CU13a-h	ST16	*0.442*	*0.442*	*0.442*							Note 2
Perforation Line #2 Cartridge Collector (CU13j)	CU13j	ST16	*0.221*	*0.221*	*0.221*							Note 2
Perforation Line #1 Cartridge Collector (CU13i)	CU13i	ST16	*0.221*	*0.221*	*0.221*							Note 2
Paint Line #3 Booth Filter (CU14)	CU14	ST15A	*0.279*	*0.279*	*0.279*			*13.720*				
Paint Line #2 Booth Filter (CU15)	CU15	ST15B	*0.279*	*0.279*	*0.279*			*13.720*				
Paint Line #1 Booth Filter (CU17)	CU17	ST16	*2.572*	*2.572*	*2.572*			*2.804*				
Core Silica Sand Silo A Bin Vent Filter (CU19)	CU19	ST09	*0.001*	*0.001*	*0.001*							Note 2
Core Silica Sand Silo B Bin Vent Filter (CU20)	CU20	ST09	*0.001*	*0.001*	*0.001*							Note 2
Snag Grinder #1 Fabric Filter (CU21)	CU21	ST12	*0.169*	*0.169*	*0.169*							Note 2
Snag Grinder #2 Fabric Filter (CU22)	CU22	ST12	*0.169*	*0.169*	*0.169*							Note 2
Emergency Generator #1	EU72	STG1	*2.56E-02*	*2.56E-02*	*2.56E-02*	*5.57E-01*	*1.18E+00*	*3.31E-02*	*3.12E-01*		*6.06E+01*	
Emergency Generator #2	EU73	STG2	*2.56E-02*	*2.56E-02*	*2.56E-02*	*5.59E-01*	*1.18E+00*	*3.31E-02*	*3.12E-01*		*6.06E+01*	
Emergency Generator #3	EU74	STG3	*6.08E-03*	*6.08E-03*	*6.08E-03*	*5.68E-03*	*8.64E-02*	*6.86E-03*	*1.86E-02*		*3.21E+00*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Total Emissions			**28.48**	**28.48**	**28.48**	**0.88**	**13.24**	**223.47**	**333.80**	**0.02**	**15412.45**	Note 3

Note 1: PM, PM_{10} and $PM_{2.5}$ emissions are included in the emissions from the air pollution control device vented to the identified stack.

Note 2: Emissions from this air pollution control device are emitted inside the facility and assumed captured via a second air pollution control device associated with the identified stack. "Total Emissions" do not include these units but are assumed to be a portion of the emissions associated with the stack of the secondary air pollution control device.

Note 3: "Total Emissions" do not include the emissions from the emergency generators.

Note 4: Emissions are captured by CU08 and CU11; emissions assigned to CU11 for worksheet construction.

Note 5: Non-PM criteria pollutant emissions are summed to their referenced stack in the table below.

Note 6: The air pollution control device associated with the unit emit indoors and exhaust via the identified stack.

Table 5-3. Emission Unit and Pollutants with PSD SER

Emission Unit	Description	PM PM_{10} $PM_{2.5}$	VOC	CO
EU01	Charge Handling	X		
EU05	Refractory Burner #1	X	X	X
EU06	Refractory Burner #2	X	X	X
EU07	Induction Furnace #1	X	X	X
EU08	Induction Furnace #2	X	X	X
EU09	Induction Furnace #3	X	X	X
EU10	Induction Furnace #4	X	X	X
EU13	Hot Metal Transfer	X		
EU15	Pouring Furnace #1	X	X	X
EU17	Melt Baghouse Waste Dust Silo	X		
EU18	Refractory Curing Mobile Burner	X	X	X
EU19	Mold Silica Sand Silo	X		
EU20	Blend Silo	X		
EU21	Bentonite Silo	X		
EU22	Mold Sand Handling and Preparation	X		
EU33	Mold Making #1	X		
EU35A	Core Silica Sand Silo A	X		
EU35B	Core Silica Sand Silo B	X		
EU36	Core Sand Handling and Preparation	X		
EU39	PUCB Core Machine #1	X	X	
EU40	PUCB Core Machine #2	X	X	
EU43	Core Wash Station #1		X	
EU44	Core Dryer #1	X	X	X
EU45	Core Dryer #2	X	X	X
EU50	Pouring #1	X	X	X
EU52	Mold Cooling	X	X	X
EU53	Shakeout Conveyor	X	X	X
EU57	Sand Plant Waste Sand Silo	X		
EU59	Casting Cooling	X		
EU60	Sorting Conveyor	X		
EU61	Steel Shot Blasting #1	X		
EU63	Fettling Baghouse Waste Dust Silo	X		
EU64	Auto Grinding #1	X		
EU65	Auto Grinding #2	X		
EU66	Machining Lines (9)	X		
EU67	Perforation Line #2	X		
EU68	Paint Line #3	X	X	
EU69	Paint Line #2	X	X	
EU71	Paint Line #1	X	X	
EU72	Emergency Generator #1	X	X	X
EU73	Emergency Generator #2	X	X	X
EU74	Emergency Generator #3	X	X	X
EU75	Diesel Storage Tank		X	
EU77	Snag Grinder #1	X		
EU78	Snag Grinder #2	X		
EU79	Core Wash Station #2		X	
EU82	Rust Preventative Application		X	
EU83	Rotary Sprue Cleaner and Conveyors	X		
EU84	Perforation Line #1	X		

Table 5-4. Units Emitting Particulate Matter

Emission Unit	Description
EU01	Charge Handling
EU05	Refractory Burner #1
EU06	Refractory Burner #2
EU07	Induction Furnace #1
EU08	Induction Furnace #2
EU09	Induction Furnace #3
EU10	Induction Furnace #4
EU13	Hot Metal Transfer
EU15	Pouring Furnace #1
EU17	Melt Baghouse Waste Dust Silo
EU18	Refractory Curing Mobile Burner
EU19	Mold Silica Sand Silo
EU20	Blend Silo
EU21	Bentonite Silo
EU22	Mold Sand Handling and Preparation
EU33	Mold Making #1
EU35A	Core Silica Sand Silo A
EU35B	Core Silica Sand Silo B
EU36	Core Sand Handling and Preparation
EU39	PUCB Core Machine #1
EU40	PUCB Core Machine #2
EU44	Core Dryer #1
EU45	Core Dryer #2
EU50	Pouring #1
EU52	Mold Cooling
EU53	Shakeout Conveyor
EU57	Sand Plant Waste Sand Silo
EU59	Casting Cooling
EU60	Sorting Conveyor
EU61	Steel Shot Blasting #1
EU63	Fettling Baghouse Waste Dust Silo
EU64	Auto Grinding #1
EU65	Auto Grinding #2
EU66	Machining Lines (9)
EU67	Perforation Lines (1)
EU68	Paint Line #3
EU69	Paint Line #2
EU71	Paint Line #1
EU72	Emergency Generator #1
EU73	Emergency Generator #2
EU74	Emergency Generator #3
EU77	Snag Grinder #1
EU78	Snag Grinder #2
EU83	Rotary Sprue Cleaner and Conveyors
EU84	Perforation Line #1

Table 5-5. Particulate Matter - RBLC Determinations

RBLCID	FACILITY NAME	PROCESS NAME	PROCESS TYPE	THRUPUT	THRUPUT UNITS	POLLUTANT	CONTROL METHOD CODE	CONTROL METHOD DESCRIPTION	EMISSION LIMIT 1	EMISSION LIMIT 1 UNIT	PERCENT EFFICIENCY	COMPLIANCE VERIFIED
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Particulate Matter (PM)	A	SCRUBBER AND BAGHOUSE	0.006	GR/DSCF	0	U
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Particulate Matter (PM)	A	SCRUBBER AND BAGHOUSE	0.006	GR/DSCF	0	U
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Particulate Matter (PM)	A	SCRUBBER AND BAGHOUSE	0.006	GR/DSCF	0	U
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Particulate Matter (PM)	A	SCRUBBER AND BAGHOUSE	0.006	GR/DSCF	0	U
IA-0093	DEXTER FOUNDRY, INC.	INDUCTION FURNACE	81.42	8.7	T/H	Particulate Matter (PM)	A	BAGHOUSE	0.042	LB/T	0	U
IA-0093	DEXTER FOUNDRY, INC.	INDUCTION FURNACE	81.42	8.7	T/H	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.042	LB/T	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGMACTZZZZZ	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.1	LB/T	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMACTZZZZZ	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.1	LB/T	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMACTZZZZZ	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.1	LB/T	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMACTZZZZZ	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.1	LB/T	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMACTZZZZZ	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.1	LB/T	99	N
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MELTING AND POURING (EU-MP)	81.42	115500	T/YR	Particulate Matter (PM)	A	HOODS, ENCLOSURES, DUCTWORK AND A 37,500 ACFM BAGHOUSE.	0.3	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MELTING AND POURING (EU-MP)	81.42	115500	T/YR	Particulate Matter (PM)	A	HOODS, ENCLOSURES, DUCTWORK AND A 37,500 ACFM BAGHOUSE.	0.3	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MELTING AND POURING (EU-MP)	81.42	115500	T/YR	Particulate Matter (PM)	A	HOODS, ENCLOSURES, DUCTWORK AND A 37,500 ACFM BAGHOUSE.	0.3	LB/H	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.7	LB/H	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.7	LB/H	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.7	LB/H	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.7	LB/H	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.7	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF E	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF E	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF E	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF E	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	3 HUNTER INDUCTION FURNACES (EU-131, EU-132, EU-133)	81.42	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF E	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 10 µ (TPM10)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, filterable (FPM)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 10 µ (TPM10)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, filterable (FPM)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 10 µ (TPM10)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, filterable (FPM)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 10 µ (TPM10)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N

MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, filterable (FPM)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 10 µ (TPM10)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Particulate matter, filterable (FPM)	A	Ladle cover and two baghouses (A and B)	0.002	GR/DSCF	98	N
IN-0136	THYSSENKRUPP WAPUPACA, INC.	16 TON IRON BATH DESULFURIZATION LADLE OPERATION	81.43	100	T/H	Particulate matter, filterable (FPM)	A	FABRIC FILTER BAGHOUSE	0.005	GR/DSCF	99.9	U
IN-0136	THYSSENKRUPP WAPUPACA, INC.	16 TON IRON BATH DESULFURIZATION LADLE OPERATION	81.43	100	T/H	Particulate matter, filterable (FPM)	A	FABRIC FILTER BAGHOUSE	0.005	GR/DSCF	99.9	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA CORE SAND STORAGE SILO (EU-201)	81.44	30	T/H OF CORE SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.001	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA CORE SAND STORAGE SILO (EU-201)	81.44	30	T/H OF CORE SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.001	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA CORE SAND STORAGE SILO (EU-201)	81.44	30	T/H OF CORE SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.001	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA CORE SAND STORAGE SILO (EU-201)	81.44	30	T/H OF CORE SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.001	LB/H	0	
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse F limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse F	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse F limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse F	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse F limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse F	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM-Baghouse G limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse G	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM-Baghouse G limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse G	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM-Baghouse G limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse G	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA BOND AND SAND STORAGE SILO (EU-202)	81.44	0		Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.04	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA NEW SAND DAY BIN (EU-DNS)	81.44	10	T/H OF SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BING VENT FILTERS	0.04	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA BOND AND SAND STORAGE SILO (EU-202)	81.44	0		Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.04	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA NEW SAND DAY BIN (EU-DNS)	81.44	10	T/H OF SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BING VENT FILTERS	0.04	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA BOND AND SAND STORAGE SILO (EU-202)	81.44	0		Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.04	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA NEW SAND DAY BIN (EU-DNS)	81.44	10	T/H OF SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BING VENT FILTERS	0.04	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA BOND AND SAND STORAGE SILO (EU-202)	81.44	0		Particulate matter, filterable < 10 µ (FPM10)	A	BIN VENT FILTERS	0.04	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA NEW SAND DAY BIN (EU-DNS)	81.44	10	T/H OF SAND	Particulate matter, filterable < 10 µ (FPM10)	A	BING VENT FILTERS	0.04	LB/H	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.31	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.31	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.31	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.31	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.31	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.31	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.31	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.31	LB/HR	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MOLD MACHINE AND SAND HANDLING (EU-SS)	81.44			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 50,900 ASCM BAGHOUSE.	2.3	LB/H	99	U

MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MOLD MACHINE AND SAND HANDLING (EU-SS)	81.44			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 50,900 ASCM BAGHOUSE.	2.3	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MOLD MACHINE AND SAND HANDLING (EU-SS)	81.44			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 50,900 ASCM BAGHOUSE.	2.3	LB/H	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse F limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse F	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse F limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse F	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse F limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse F	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM-Baghouse G limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse G	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM-Baghouse G limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse G	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM-Baghouse G limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse G	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouses A and B combined limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse E limits	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHMM--Baghouse F limits	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse F	0.002	GR/DSCF	99

MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse L	0.002	GR/DSCF	97	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse L	0.002	GR/DSCF	97	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Particulate matter, filterable (FPM)	A	Baghouse L	0.002	GR/DSCF	97	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA CORE SAND STORAGE SILO (EU-201)	81.44	30	T/H OF CORE SAND	Particulate matter, filterable (FPM)	A	BIN VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA BOND AND SAND STORAGE SILO (EU-202)	81.44	0		Particulate matter, filterable (FPM)	A	BIN VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA NEW SAND DAY BIN (EU-DNS)	81.44	10	T/H OF SAND	Particulate matter, filterable (FPM)	A	BING VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA CORE SAND STORAGE SILO (EU-201)	81.44	30	T/H OF CORE SAND	Particulate matter, filterable (FPM)	A	BIN VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA BOND AND SAND STORAGE SILO (EU-202)	81.44	0		Particulate matter, filterable (FPM)	A	BIN VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA NEW SAND DAY BIN (EU-DNS)	81.44	10	T/H OF SAND	Particulate matter, filterable (FPM)	A	BING VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA CORE SAND STORAGE SILO (EU-201)	81.44	30	T/H OF CORE SAND	Particulate matter, filterable (FPM)	A	BIN VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA BOND AND SAND STORAGE SILO (EU-202)	81.44	0		Particulate matter, filterable (FPM)	A	BIN VENT FILTERS	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA NEW SAND DAY BIN (EU-DNS)	81.44	10	T/H OF SAND	Particulate matter, filterable (FPM)	A	BING VENT FILTERS	0.003	GR/DSCF OF*	0	U
WI-0236	THYSSEN KRUPP PLANT #4	DISA LINES #4 & #5	81.44			Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.005	GR/ACF	99	N
WI-0238	THYSSEN KRUPP PLANT #1	SAND MULLORS	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0238	THYSSEN KRUPP PLANT #1	SAND HANDLING	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	SAND MULLORS	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0238	THYSSEN KRUPP PLANT #1	SAND HANDLING	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	SAND MULLORS	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0238	THYSSEN KRUPP PLANT #1	SAND HANDLING	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0236	THYSSEN KRUPP PLANT #4	DISA LINES #4 & #5	81.44			Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.005	GR/ACF	99	N
WI-0238	THYSSEN KRUPP PLANT #1	SAND MULLORS	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0238	THYSSEN KRUPP PLANT #1	SAND HANDLING	81.44			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P42 Sand Handling	81.44	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUMLTXFER	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Two baghouses (A and B)	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUMLTXFER	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Two baghouses (A and B)	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUMLTXFER	81.45	0		Particulate matter, filterable (FPM)	A	Two baghouses (A and B)	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouse D limits	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N

MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouse D limits	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouse D limits	81.45	0		Particulate matter, filterable (FPM)	B	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUMLTXFER	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Two baghouses (A and B)	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUMLTXFER	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Two baghouses (A and B)	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUMLTXFER	81.45	0		Particulate matter, filterable (FPM)	A	Two baghouses (A and B)	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouse D limits	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N

*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.76	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.76	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.76	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.76	LB/HR	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	IN-LINE FILTERS	2.5	LB/H	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	5.14	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Bahouse	5.14	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	5.14	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Bahouse	5.14	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	5.14	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Bahouse	5.14	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	5.14	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Bahouse	5.14	LB/HR	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouses A and B combined limits	81.45	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouse D limits	81.45	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouse D limits	81.45	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL--Baghouse D limits	81.45	0		Particulate matter, filterable (FPM)	B	Baghouse D	0.002	GR/DSCF	99	N
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF *	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF *	0	U
WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35A Line 2 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35A Line 2 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF *	0	U
WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35A Line 2 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35B Line 1 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF*	0	U

IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF *	0	U
WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35A Line 2 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35A Line 2 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 POURING AND COOLING PROCESS	81.45	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	IN-LINE FILTERS	0.005	GR/DSCF OF *	0	U
WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P50 East Millroom Cast Handling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P38 Line 4 to 6 Cast Coolers	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35A Line 2 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P35B Line 1 Pouring/Mold Cooling	81.45	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse C limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse C	0.0015	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N

MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse D limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT--Baghouse E limits	81.46	0		Particulate matter, filterable (FPM)	A	Baghouse E	0.002	GR/DSCF	99	N
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.73	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.73	LB/HR	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-11)	1	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-11)	1	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-11)	1	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-11)	1	LB/H	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.29	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.29	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.29	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.29	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.29	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.29	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.29	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.29	LB/HR	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable < 10 µ (FPM10)	A	2 BAGHOUSES (DC-6 & DC-7)	4.6	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable < 10 µ (FPM10)	A	2 BAGHOUSES (DC-6 & DC-7)	4.6	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable < 10 µ (FPM10)	A	2 BAGHOUSES (DC-6 & DC-7)	4.6	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable < 10 µ (FPM10)	A	2 BAGHOUSES (DC-6 & DC-7)	4.6	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable (FPM)	A	2 BAGHOUSES (DC-6 & DC-7)	0.003	GR/DSCF	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-11)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable (FPM)	A	2 BAGHOUSES (DC-6 & DC-7)	0.003	GR/DSCF	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-11)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable (FPM)	A	2 BAGHOUSES (DC-6 & DC-7)	0.003	GR/DSCF	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-11)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable (FPM)	A	2 BAGHOUSES (DC-6 & DC-7)	0.003	GR/DSCF	0	U

IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-11)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 SHAKEOUT (EU-324), DISA 1/DISA 2 SAND SYSTEMS (EU-321), AND DISA 1 CASTING COOLING (EU-325)	81.46	10	T/H OF METAL*	Particulate matter, filterable (FPM)	A	2 BAGHOUSES (DC-6 & DC-7)	0.003	GR/DSCF	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 SAND MULLER (EU-331) AND THE DISA 2 SHAKEOUT (EU-334)	81.46	10	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-11)	0.003	GR/DSCF OF*	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	SHAKEOUT	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	CAST COOLING	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	SHAKEOUT	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	CAST COOLING	81.46			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P33B Line 3 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P34A Line 1 Shakeout	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P63 Line 6 Casting/Gating Handling	81.46	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-8)	0.003	GR/DSCF OF*	0	U

IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-8)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-8)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-8)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-8)	0.003	GR/DSCF OF*	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUGRIND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUGRIND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUGRIND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
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MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
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MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
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MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse H and J	0.001	GR/DSCF	99	N
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MI-0429	EAST JORDAN FOUNDRY LLC	EUGRIND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
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MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUBLAST--Baghouse H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUGRIND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUGRIND--Baghouses H and J combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUGRIND--Baghouses H and J combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses H and J	0.001	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, filterable (FPM)	A	bAGHOUSE k	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B associated with charge handling.	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF*	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E portion of charge handling operations	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse E portion of charge handling operations.	0.002	GR/DSCF	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF*	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, filterable (FPM)	A	bAGHOUSE k	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF*	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B associated with charge handling.	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E portion of charge handling operations	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse E portion of charge handling operations.	0.002	GR/DSCF	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N

MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF*	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, filterable (FPM)	A	bAGHOUSE k	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF OF*	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
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MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, filterable (FPM)	A	bAGHOUSE k	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B associated with charge handling.	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E portion of charge handling operations	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse E portion of charge handling operations.	0.002	GR/DSCF	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouses A and B limits combined	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUWASTESAND--Baghouse D limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse D	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EULDLREPAIR (Ladle Repair)	81.49	0		Particulate matter, filterable (FPM)	A	bAGHOUSE k	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouses A and B combined	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND--Baghouses A and B combined limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouses A and B associated with charge handling.	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse E portion of charge handling operations	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse E portion of charge handling operations.	0.002	GR/DSCF	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse K	0.002	GR/DSCF	99	N
IN-0136	THYSSENKRUPP WAPUPACA, INC.	DUCTILE IRON TREATMENT STATIONS	81.49	50	T/H EACH	Particulate matter, filterable (FPM)	A	BAGHOUSE	0.005	GR/DSCF	99.9	U

MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse K	0.002	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse K limits	81.49	0		Particulate matter, filterable (FPM)	A	Baghouse K	0.002	GR/DSCF	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-12)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-12)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-12)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-12)	0.003	GR/DSCF OF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE	0.003	GR/DSCF*	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable (FPM)	A	BAGHOUSE (DC-12)	0.003	GR/DSCF OF*	0	U
IN-0136	THYSSENKRUPP WAPUPACA, INC.	DUCTILE IRON TREATMENT STATIONS	81.49	50	T/H EACH	Particulate matter, filterable (FPM)	A	BAGHOUSE	0.005	GR/DSCF	99.9	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P73 - Line 5 Cast Cooling	81.49	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P73 - Line 5 Cast Cooling	81.49	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P73 - Line 5 Cast Cooling	81.49	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P73 - Line 5 Cast Cooling	81.49	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P73 - Line 5 Cast Cooling	81.49	20	T/H OF METAL	Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P73 - Line 5 Cast Cooling	81.49	20	T/H OF METAL	Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.0045	GRAINS/ACF	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P73 - Line 5 Cast Cooling	81.49	20	T/H OF METAL	Particulate matter, total (TPM)	A	Baghouse	0.0045	GRAINS/ACF	0	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.13	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.13	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.13	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA MAGNESIUM TREATMENT SYSTEM	81.49	20	T/H OF METAL	Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.13	LB/H	0	
IN-0189	WAUPACA FOUNDRY, INC PLANT 5	LINE 1 LADLE CLEANING OPERATION (P86A) AND LINE 4 LADLE CLEANING OPERATION (P86B)	81.49	100	LBS/H BURN BARS	Particulate matter, total (TPM)	A	BAGHOUSE	0.64	LB/H	99	U
IN-0189	WAUPACA FOUNDRY, INC PLANT 5	LINE 1 LADLE CLEANING OPERATION (P86A) AND LINE 4 LADLE CLEANING OPERATION (P86B)	81.49	100	LBS/H BURN BARS	Particulate matter, total < 10 µ (TPM10)	A	BAGHOUSE	0.64	LB/H	99	
IN-0189	WAUPACA FOUNDRY, INC PLANT 5	LINE 1 LADLE CLEANING OPERATION (P86A) AND LINE 4 LADLE CLEANING OPERATION (P86B)	81.49	100	LBS/H BURN BARS	Particulate matter, total < 2.5 µ (TPM2.5)	A	BAGHOUSE	0.64	LB/H	99	
WI-0236	THYSSEN KRUPP PLANT #4	MATERIAL HANDLING, CHARGE BAY	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	CLEANING AND GRINDING OF CASTINGS	81.49			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	CLEANING AND GRINDING OF CASTINGS	81.49			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	CLEANING AND GRINDING OF CASTINGS	81.49			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	SHOT BLAST	81.49			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U

*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
WI-0236	THYSSEN KRUPP PLANT #4	MATERIAL HANDLING, CHARGE BAY	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	0.005	GR/ACF	99	U
WI-0238	THYSSEN KRUPP PLANT #1	CLEANING AND GRINDING OF CASTINGS	81.49			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	SHOT BLAST	81.49			Particulate Matter (PM)	A	BAGHOUSE	0.005	GR/ACF	0	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total (TPM)	A	Baghouse	0.005	GR/ACF	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E portion of charge handling operations	0.022	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E portion of charge handling operations	0.022	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E portion of charge handling operations	0.022	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E portion of charge handling operations	0.022	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUCHRGHAND-Baghouse E Limits	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse E portion of charge handling operations	0.022	GR/DSCF	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Each engine is a certified engine with associated required controls.	0.216	LB/H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Each engine is a certified engine with associated required controls.	0.216	LB/H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Each engine is a certified engine with associated required controls.	0.216	LB/H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Each engine is a certified engine with associated required controls.	0.216	LB/H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Each engine is a certified engine with associated required controls.	0.216	LB/H	99	N
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-8)	0.42	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-8)	0.42	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-8)	0.42	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-8)	0.42	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 1 CASTING COOLING (EU-325), THE DISA 1 SHOT BLAST (EU-411), THE DISA 2 SHOT BLAST (EU-431), AND THE DISA 1 GRINDING (EU-413)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-8)	0.42	LB/H	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P72 Cleaning Feed Conveyer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.47	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.6	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.6	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.6	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.6	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.6	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.6	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	0.6	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P52 #2 TB Cleaning/Grinding	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	0.6	LB/HR	99	U
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-12)	0.84	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-12)	0.84	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-12)	0.84	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-12)	0.84	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	DISA 2 CASTING COOLING (EU-335) AND THE DISA 2 GRINDING (EU-433)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE (DC-12)	0.84	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	1	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	1	LB/H	0	

IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	1	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	1	LB/H	0	
IN-0147	ROCHESTER METAL PRODUCTS CORP.	2 NATURAL GAS FIRED PREHEATERS (#1 & 2), CHARGE HANDLING SYSTEM (EU-118), 2 ELECTRIC INDUCTION FURNACES (EU-114 & EU-115)	81.49	0		Particulate matter, filterable < 10 µ (FPM10)	A	BAGHOUSE	1	LB/H	0	
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P47 Sand/Casting/Gating Transfer	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.11	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.84	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.84	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.84	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.84	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	1.84	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P65 Line 1 to 5 Cast Transfers	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	1.84	LB/HR	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	AUTOMATED MOLD COOLING CONVEYOR SYSTEM AND SHAKEOUT LINES	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 61,200 ACFM BAGHOUSE.	2.47	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	AUTOMATED MOLD COOLING CONVEYOR SYSTEM AND SHAKEOUT LINES	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 61,200 ACFM BAGHOUSE.	2.47	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	AUTOMATED MOLD COOLING CONVEYOR SYSTEM AND SHAKEOUT LINES	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 61,200 ACFM BAGHOUSE.	2.47	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	CASTING COOLING AND SHOT BLAST MACHINE (EU-CCFBACK)	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 65,360 ACFM BAGHOUSE.	2.64	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	CASTING COOLING AND SHOT BLAST MACHINE (EU-CCFBACK)	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 65,360 ACFM BAGHOUSE.	2.64	LB/H	99	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	CASTING COOLING AND SHOT BLAST MACHINE (EU-CCFBACK)	81.49			Particulate matter, filterable < 10 µ (FPM10)	A	HOODS, ENCLOSURES, DUCTWORK AND A 65,360 ACFM BAGHOUSE.	2.64	LB/H	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	4.27	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	4.27	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	4.27	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	4.27	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	4.27	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	4.27	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 10 µ (TPM10)	A	Baghouse	4.27	LB/HR	99	U
*WI-0288	WAUPACA FOUNDRY, INC. PLANT 1	P54 Lines 3/4 Spinner Feed/Cleaning/Grinding/Cast Handling	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	A	Baghouse	4.27	LB/HR	99	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 10 µ (TPM10)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, filterable (FPM)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 10 µ (TPM10)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, filterable (FPM)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 10 µ (TPM10)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, filterable (FPM)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 10 µ (TPM10)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, filterable (FPM)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 10 µ (TPM10)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, total < 2.5 µ (TPM2.5)	N		7.6	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Particulate matter, filterable (FPM)	N		7.6	LB/MMSCF	0	N

Table 5-6. BACT Determinations - Particulate Matter

Emission Unit	Description	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$	BACT Justification
EU01	Charge Handling	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	For this process there is no RBLC determination less than the proposed BACT for an APCD/stack that contains a source of significant condensable PM emissions. One RBLC entry for charge handling operation [RBLC ID MI-429] identified an outlet loading of 0.001 gr/dscf but the units routed to the stack (shotblasting, grinding and waste sand handling) do not have condensable particulates. For this emissions unit Method 5 was used to determine compliance.
EU07	Induction Furnace #1	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	For this process there is no RBLC determination less than the proposed BACT. For electric induction furnaces, there is one RLBC entry at 0.002 gr/dscf [RBLC ID MI-0429] and one RBLC entry of 0.003 gr/dscf [IN-0147].
EU08	Induction Furnace #2	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	For this process there is no RBLC determination less than the proposed BACT. For electric induction furnaces, there is one RLBC entry at 0.002 gr/dscf [RBLC ID MI-0429] and one RBLC entry of 0.003 gr/dscf [IN-0147].
EU09	Induction Furnace #3	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	For this process there is no RBLC determination less than the proposed BACT. For electric induction furnaces, there is one RLBC entry at 0.002 gr/dscf [RBLC ID MI-0429] and one RBLC entry of 0.003 gr/dscf [IN-0147].
EU10	Induction Furnace #4	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	For this process there is no RBLC determination less than the proposed BACT. For electric induction furnaces, there is one RLBC entry at 0.002 gr/dscf [RBLC ID MI-0429] and one RBLC entry of 0.003 gr/dscf [IN-0147].
EU13	Hot Metal Transfer	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	0.0015 gr/dscf 1.98 lb/hr 8.68 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Hot Metal Transfer at 0.002 gr/dscf [RBLC ID MI-0429].
EU17	Melt and Baghouse Waste Dust Silo	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	For this process there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].
EU19	Mold Silica Sand Silo	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	For this process there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].
EU20	Blend Silo	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	For this process there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].
EU21	Bentonite Silo	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	For this process, there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].
EU22	Mold Sand Handling and Preparation	0.002 gr/dscf 1.75 lb/hr 7.67 ton/yr	0.002 gr/dscf 1.75 lb/hr 7.67 ton/yr	0.002 gr/dscf 1.75 lb/hr 7.67 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Process ID 81.440 at 0.002 gr/dscf [RBLC ID MI-0429], one RBLC entry at 0.003 gr/dscf [IN-0147] and multiple entries at 0.005 gr/dscf [WI-0236 and WI-0238].
EU33	Mold Making #1	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Process ID 81.440 at 0.002 gr/dscf [RBLC ID MI-0429], one RBLC entry at 0.003 gr/dscf [IN-0147] and multiple entries at 0.005 gr/dscf [WI-0236 and WI-0238].
EU35A	Core Silica Sand Silo A	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	For this process there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].
EU35B	Core Silica Sand Silo B	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.001 ton/yr	For this process there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].

EU36	Core Sand Handling and Preparation	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Process ID 81.440 at 0.002 gr/dscf [RBLC ID MI-0429], one RBLC entry at 0.003 gr/dscf [IN-0147] and multiple entries at 0.005 gr/dscf [WI-0236 and WI-0238].
EU39	PUCB Core Machine #1	0.0005 gr/dscf 0.032 lb/hr 0.138 ton/yr	0.0005 gr/dscf 0.032 lb/hr 0.138 ton/yr	0.0005 gr/dscf 0.032 lb/hr 0.138 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There was one entry at 0.002 gr/dscf [MI-0429]. Emissions are not distinguishable in the RBLC between core sand handling (e.g. conveying, mixing) and generation of fugitive emissions during purging of catalyst.
EU40	PUCB Core Machine #2	0.0005 gr/dscf 0.032 lb/hr 0.138 ton/yr	0.0005 gr/dscf 0.032 lb/hr 0.138 ton/yr	0.0005 gr/dscf 0.032 lb/hr 0.138 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There was one entry at 0.002 gr/dscf [MI-0429]. Emissions are not distinguishable in the RBLC between core sand handling (e.g. conveying, mixing) and generation of fugitive emissions during purging of catalyst.
EU50	Pouring #1	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Process ID 81.450 at 0.002 gr/dscf [RBLC ID MI-0429], one RBLC entry at 0.0045 gr/dscf [WI-0256], and multiple entries at 0.005 gr/dscf [IN-0147, WI-0238, WI-0288, WI-0236 and WI-0238].
EU52	Mold Cooling	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Process ID 81.450 at 0.002 gr/dscf [RBLC ID MI-0429], one RBLC entry at 0.0045 gr/dscf [WI-0256], and multiple entries at 0.005 gr/dscf [IN-0147, WI-0288, WI-0236 and WI-0238].
EU53	Shakeout Conveyor	0.002 gr/dscf 1.75 lb/hr 7.67 ton/yr	0.002 gr/dscf 1.75 lb/hr 7.67 ton/yr	0.002 gr/dscf 1.75 lb/hr 7.67 ton/yr	For this process there is one RBLC determination less than the proposed BACT. Once facility [MI-0429], exhausts shakeout emissions to three different baghouses [C, D and E]. Baghouse C has an emisison limit of 0.0015 gr/dscf while Baghouses D and E have emisison rates of 0.002 gr/dscf. It is impossible to determine which of these three baghouses see the bulk of the condensable particulate emissions. Several other RBLC entries have emissions exceeding the proposed BACT including RBLC ID IN-0147 (0.003 gr/dscf), WI-0256 (0.0045 gr/dscf), WI-0239 (0.005
EU57	Sand Plant Waste Sand Silo	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	For this process there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].
EU59	Casting Cooling	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	0.0015 gr/dscf 1.43 lb/hr 6.24 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains several entries above the proposed BACT including 0.003 gr/dscf [RBLC ID IN-0147], 0.0045 gr/dscf [RBLC ID WI-0256], and 0.005 gr/dscf [RBLC ID WI-0239, WI-0288].
EU60	Sorting Conveyor	0.001 gr/dscf 0.552 lb/hr 2.417 ton/yr	0.001 gr/dscf 0.552 lb/hr 2.417 ton/yr	0.001 gr/dscf 0.552 lb/hr 2.417 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains several entries above the proposed BACT including 0.003 gr/dscf [RBLC ID IN-0147] and multiple entries of 0.005 gr/dscf [RBLC WI-0288].
EU61	Steel Shot Blasting #1	0.001 gr/dscf 0.552 lb/hr 2.417 ton/yr	0.001 gr/dscf 0.552 lb/hr 2.417 ton/yr	0.001 gr/dscf 0.552 lb/hr 2.417 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains an entry equivalent to the proposed BACT [MI-0429] and several entries above the proposed BACT including 0.003 gr/dscf [RBLC ID IN-0147] and multiple entries of 0.005 gr/dscf [RBLC WI-0238, WI-0239, and WI-0288].
EU63	Fettling Baghouse Waste Dust Silo	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	0.003 gr/dscf 0.015 lb/hr 0.068 ton/yr	For this process, there is no RBLC determination less than the proposed BACT in the equivalent unit of gr/dscf. For silos, there is one additional RLBC entry at 0.003 gr/dscf [RBLC ID IN-0147].
EU64	Auto Grinding #1	0.001 gr/dscf 0.552 lb/hr 2.417 ton/yr	0.001 gr/dscf 0.552 lb/hr 2.417 ton/yr	0.001 gr/dscf 0.552 lb/hr 2.417 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains an entry equivalent to the proposed BACT [MI-0429] and multiple entries of 0.005 gr/dscf [RBLC WI-0238 and WI-0288].
EU65	Auto Grinding #2	0.001 gr/dscf 0.552 lb/hr 2.417 ton/yr	0.001 gr/dscf 0.552 lb/hr 2.417 ton/yr	0.001 gr/dscf 0.552 lb/hr 2.417 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains an entry equivalent to the proposed BACT [MI-0429] and multiple entries of 0.005 gr/dscf [RBLC WI-0238 and WI-0288].
EU66	Machining Lines (9)	0.001 gr/dscf 0.101 lb/hr 0.442 ton/yr	0.001 gr/dscf 0.101 lb/hr 0.442 ton/yr	0.001 gr/dscf 0.101 lb/hr 0.442 ton/yr	There are no entries for this type of operation in the RBLC. Similar operations with larger baghouse are identified in the RBLC at 0.001 gr/dscf [MI-0429] and multiple entries of 0.005 gr/dscf [RBLC WI-0238 and WI-0288].
EU67	Perforation Line #2	0.001 gr/dscf 0.050 lb/hr 0.221 ton/yr	0.001 gr/dscf 0.050 lb/hr 0.221 ton/yr	0.001 gr/dscf 0.050 lb/hr 0.221 ton/yr	There are no entries for this type of operation in the RBLC. Similar operations with larger baghouse are identified in the RBLC at 0.001 gr/dscf [MI-0429] and multiple entries of 0.005 gr/dscf [RBLC WI-0238 and WI-0288].

EU68	Paint Line #3	0.0028 gr/dscf 0.064 lb/hr 0.279 ton/yr	0.0028 gr/dscf 0.064 lb/hr 0.279 ton/yr	0.0028 gr/dscf 0.064 lb/hr 0.279 ton/yr	For this process there were no RBLC determination under either iron and/or steel foundries. For miscellaneous metal parts and products [process id 81.44] only the FWNA was identified.
EU69	Paint Line #2	0.0022 gr/dscf 0.064 lb/hr 0.279 ton/yr	0.0022 gr/dscf 0.064 lb/hr 0.279 ton/yr	0.0022 gr/dscf 0.064 lb/hr 0.279 ton/yr	For this process there were no RBLC determination under either iron and/or steel foundries. For miscellaneous metal parts and products [process id 81.44] only the FWNA was identified.
EU71	Paint Line #1	0.0035 gr/dscf 0.587 lb/hr 2.572 ton/yr	0.0035 gr/dscf 0.587 lb/hr 2.572 ton/yr	0.0035 gr/dscf 0.587 lb/hr 2.572 ton/yr	For this process there were no RBLC determination under either iron and/or steel foundries. For miscellaneous metal parts and products [process id 81.44] only the FWNA was identified.
EU77	Snag Grinder #1	0.003 gr/dscf 0.039 lb/hr 0.169 ton/yr	0.003 gr/dscf 0.039 lb/hr 0.169 ton/yr	0.003 gr/dscf 0.039 lb/hr 0.169 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains an entry equivalent to the proposed BACT [MI-0429] and multiple entries of 0.005 gr/dscf [RBLC WI-0238 and WI-0288].
EU78	Snag Grinder #2	0.003 gr/dscf 0.039 lb/hr 0.169 ton/yr	0.003 gr/dscf 0.039 lb/hr 0.169 ton/yr	0.003 gr/dscf 0.039 lb/hr 0.169 ton/yr	For this process there is no RBLC determination less than the proposed BACT. The RBLC contains an entry equivalent to the proposed BACT [MI-0429] and multiple entries of 0.005 gr/dscf [RBLC WI-0238 and WI-0288].
EU83	Rotary Sprue Cleaner and Conveyors	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	0.001 gr/dscf 0.573 lb/hr 2.511 ton/yr	For this process there is no RBLC determination less than the proposed BACT. There is one RLBC entry for Process ID 81.440 at 0.002 gr/dscf [RBLC ID MI-0429], one RBLC entry at 0.003 gr/dscf [IN-0147] and multiple entries at 0.005 gr/dscf [WI-0236 and WI-0238].
EU84	Perforation Line #1	0.001 gr/dscf 0.050 lb/hr 0.221 ton/yr	0.001 gr/dscf 0.050 lb/hr 0.221 ton/yr	0.001 gr/dscf 0.050 lb/hr 0.221 ton/yr	There are no entries for this type of operation in the RBLC. Similar operations with larger baghouse are identified in the RBLC at 0.001 gr/dscf [MI-0429] and multiple entries of 0.005 gr/dscf [RBLC WI-0238 and WI-0288].

Table 5-7. Units Emitting Carbon Monoxide

Emission Unit	Description
EU05	Refractory Burner #1
EU06	Refractory Burner #2
EU07	Induction Furnace #1
EU08	Induction Furnace #2
EU09	Induction Furnace #3
EU10	Induction Furnace #4
EU15	Pouring Furnace #1
EU18	Refractory Curing Mobile Burner

Table 5-8. Carbon Monoxide - RBLC Determinations

RBLCID	FACILITY NAME	PROCESS NAME	PROCESS TYPE	THRUPUT	THRUPUT UNITS	POLLUTANT	CONTROL METHOD CODE	CONTROL METHOD DESCRIPTION	EMISSION LIMIT 1	EMISSION LIMIT 1 UNIT	PERCENT EFFICIENCY	COMPLIANCE VERIFIED
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Carbon Monoxide	N		1	LB/T	0	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Carbon Monoxide	N		1	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Carbon Monoxide	N		1	LB/T	0	U
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	SHAKEOUT	81.46			Carbon Monoxide	N		1	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Carbon Monoxide	N		1	LB/T	0	U
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	SHAKEOUT	81.46			Carbon Monoxide	N		1	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Carbon Monoxide	N		1	POUND/TON OF METAL	0	U
IN-0188	WAUPACA FOUNDRY, INC PLANT 5	LINE 4 POURING/MOLD COOLING AND SHAKEOUT	81.46	40	T/H	Carbon Monoxide	P	CONTROLLED BY A MOLD VENT OFF GAS IGNITION	6	LB/T OF IRON	0	
IN-0188	WAUPACA FOUNDRY, INC PLANT 5	LINE 4 POURING/MOLD COOLING AND SHAKEOUT	81.46	40	T/H	Carbon Monoxide	P	CONTROLLED BY A MOLD VENT OFF GAS IGNITION	6	LB/T OF IRON	0	
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Carbon Monoxide	N		44.57	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Carbon Monoxide	N		44.57	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Carbon Monoxide	N		44.57	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Carbon Monoxide	N		44.57	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Carbon Monoxide	N		44.57	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Carbon Monoxide	N		44.57	LB/H	0	N
OK-0141	ARDMORE FOUNDRY	Shake Out	81.46	736	TPY	Carbon Monoxide	N		227.5	LB/HR	0	N
OK-0141	ARDMORE FOUNDRY	Shake Out	81.46	736	TPY	Carbon Monoxide	N		227.5	LB/HR	0	N

Table 5-9. CO Control Technology Cost Effectiveness - Melt Baghouse (CU01/ST02)

Control Device ID Stack ID	Pollutant	Control Technology	Total Annualized Cost ($)	Pollutant Removed (tpy)	Cost Effectiveness ($/ton removed)
CU01 ST02	CO	Fixed Bed Catalytic Oxidizer	4,739,256	57.9	81,804.00
CU01 ST02	CO	Regenerative Thermal Oxidizer	2,488,135	57.9	42,947.00
CU01 ST02	CO VOC	Fixed Bed Catalytic Oxidizer	4,736,599	66.9	70,788.00
CU01 ST02	CO VOC	Regenerative Thermal Oxidizer	2,485,499	66.9	37,145.00

Table 5-10. CO Control Technology Cost Effectiveness - Sand Plant Baghouse (CU06/ST07)

Control Device ID Stack ID	Pollutant	Control Technology	Total Annualized Cost ($)	Pollutant Removed (tpy)	Cost Effectiveness ($/ton removed)
CU06 ST07	CO	Fixed Bed Catalytic Oxidizer	3,509,428	20.5	171,027.00
CU06 ST07	CO	Regenerative Thermal Oxidizer	1,843,636	20.5	89,847.00
CU06 ST07	CO VOC	Fixed Bed Catalytic Oxidizer	3,502,157	45.1	77,684.00
CU06 ST07	CO VOC	Regenerative Thermal Oxidizer	1,836,425	45.1	40,735.00

Table 5-11. CO Control Technology Cost Effectiveness - Core/Mold Baghouse (CU08/ST09)

Control Device ID Stack ID	Pollutant	Control Technology	Total Annualized Cost ($)	Pollutant Removed (tpy)	Cost Effectiveness ($/ton removed)
CU08 ST09	CO	Fixed Bed Catalytic Oxidizer	3,484,535	227.0	15,350.00
CU08 ST09	CO	Regenerative Thermal Oxidizer	1,828,971	227.0	8,057.00
CU08 ST09	CO VOC	Fixed Bed Catalytic Oxidizer	3,446,178	356.6	9,665.00
CU08 ST09	CO VOC	Regenerative Thermal Oxidizer	1,820,848	356.6	5,106.00

Table 5-12. BACT Determinations - Carbon Monoxide

Emission Unit	Description	BACT for CO	BACT Justification
EU07	Induction Furnace #1	1.39 lb/ton metal 13.944 lb/hr 13.944 ton/yr	For this process there is no RBLC determination less than the proposed BACT and their was no identification of an emission control device for carbon monoxide. There was one entry at 9.24 lb/hr [MI-0429] and another entry at 44.55 lb/hr [MI-0385]. The MI-0385 entry is for both melting and pouring and cannot be conditioned. It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU08	Induction Furnace #2	1.39 lb/ton metal 13.944 lb/hr 13.944 ton/yr	For this process there is no RBLC determination less than the proposed BACT and their was no identification of an emission control device for carbon monoxide. There was one entry at 9.24 lb/hr [MI-0429] and another entry at 44.55 lb/hr [MI-0385]. The MI-0385 entry is for both melting and pouring and cannot be conditioned. It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU09	Induction Furnace #3	1.39 lb/ton metal 13.944 lb/hr 13.944 ton/yr	For this process there is no RBLC determination less than the proposed BACT and their was no identification of an emission control device for carbon monoxide. There was one entry at 9.24 lb/hr [MI-0429] and another entry at 44.55 lb/hr [MI-0385]. The MI-0385 entry is for both melting and pouring and cannot be conditioned. It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU10	Induction Furnace #4	1.39 lb/ton metal 13.944 lb/hr 13.944 ton/yr	For this process there is no RBLC determination less than the proposed BACT and their was no identification of an emission control device for carbon monoxide. There was one entry at 9.24 lb/hr [MI-0429] and another entry at 44.55 lb/hr [MI-0385]. The MI-0385 entry is for both melting and pouring and cannot be conditioned. It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU50	Pouring #1	6.17 lb/ton metal 92.488lb/hr 246.634 ton/yr	For this process there is no RBLC determination less than the proposed BACT and the only control method identified is "mold vent off gas ignition." There are three RBLC entries of 6 lb/ton [WI-0236 (under process 81.44), IN-0147) which appears likely for the addition of pouring, cooling and shakeout (PCS). There are equvalent emission limits of 5 lb/ton metal for several RBLC entries [RBLC ID WI-0238, WI-0256, WI-0288].
EU52	Mold Cooling	See EU50	See EU50
EU53	Shakeout Conveyor	0.515 lb/ton metal 7.725 lb/hr 20.600 ton/yr	For this process there is no RBLC determination less than the proposed BACT and the only control method identified is "mold vent off gas ignition." There are two RBLC entries of 6 lb/ton [WI-0236 (under process 81.44), IN-0147, IN-0188) which appears likely for the addition of pouring, cooling and shakeout (PCS). There are equvalent emission limits of 1 lb/ton metal for several RBLC entries [RBLC ID WI-0238, WI-0239, WI-0256].

Table 5-13. Units Emitting Volatile Organic Compounds

Emission Unit	Description
EU05	Refractory Burner #1
EU06	Refractory Burner #2
EU07	Induction Furnace #1
EU08	Induction Furnace #2
EU09	Induction Furnace #3
EU10	Induction Furnace #4
EU15	Pouring Furnace #1
EU18	Refractory Curing Mobile Burner
EU39	PUCB Core Machine #1
EU40	PUCB Core Machine #2
EU43	Core Wash Station #1
EU44	Core Dryer #1
EU45	Core Dryer #2
EU50	Pouring #1
EU52	Mold Cooling
EU53	Shakeout Conveyor
EU68	Paint Line #3
EU69	Paint Line #2
EU71	Paint Line #1
EU72	Emergency Generator #1
EU73	Emergency Generator #2
EU74	Emergency Generator #3
EU75	Diesel Storage Tank
EU79	Core Wash Station #2
EU80	Core Wash Station #3
EU81	Core Wash Station #4
EU82	Rust Preventative Application

Table 5-14. Volatile Organic Compound - RBLC Determinations

RBLCID	FACILITY NAME	PROCESS NAME	PROCESS TYPE	THRUPUT	THRUPUT UNITS	POLLUTANT	CONTROL METHOD CODE	CONTROL METHOD DESCRIPTION	EMISSION LIMIT 1	EMISSION LIMIT 1 UNIT	PERCENT EFFICIENCY	COMPLIANCE VERIFIED
IN-0288	WAUPACA FOUNDRY, INC. PLANT 5	100 KW emergency generator	17.23	1.12	MMBTU/H	Volatile Organic Compounds (VOC)	N		0.36	LB/MMBTU	0	U
IN-0288	WAUPACA FOUNDRY, INC. PLANT 5	P51A, P54A, P51B, Hot Water Heater	19.6	33.65	MMBTU/H	Volatile Organic Compounds (VOC)	N		0.005	LB/MILLION FT3	0	U
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Volatile Organic Compounds (VOC)	A	RECUPERATIVE INCINERATOR	0.02	LB/T	0	U
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Volatile Organic Compounds (VOC)	A	RECUPERATIVE INCINERATOR	0.02	LB/T	0	U
IN-0136	THYSSENKRUPP WAPUPACA, INC.	GRAY IRON CUPOLAS	81.41	100	T/H EACH	Volatile Organic Compounds (VOC)	A	INCINERATOR	0.02	LB/T OF IRON	99	
IN-0136	THYSSENKRUPP WAPUPACA, INC.	GRAY IRON CUPOLAS	81.41	100	T/H EACH	Volatile Organic Compounds (VOC)	A	INCINERATOR	0.02	LB/T OF IRON	99	
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Volatile Organic Compounds (VOC)	A	RECUPERATIVE INCINERATOR	0.02	LB/T	0	U
WI-0238	THYSSEN KRUPP PLANT #1	CUPOLA	81.41	90	T/H	Volatile Organic Compounds (VOC)	A	RECUPERATIVE INCINERATOR	0.02	LB/T	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Volatile Organic Compounds (VOC)	N		0.84	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Volatile Organic Compounds (VOC)	N		0.84	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Volatile Organic Compounds (VOC)	N		0.84	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Volatile Organic Compounds (VOC)	N		0.84	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGMELTING (flexible group includes 4 electric induction furnaces)	81.42	0		Volatile Organic Compounds (VOC)	N		0.84	LB/H	0	N
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MELTING AND POURING (EU-MP)	81.42	115500	T/YR	Volatile Organic Compounds (VOC)	N		5.28	LB/H	0	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MELTING AND POURING (EU-MP)	81.42	115500	T/YR	Volatile Organic Compounds (VOC)	N		5.28	LB/H	0	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MELTING AND POURING (EU-MP)	81.42	115500	T/YR	Volatile Organic Compounds (VOC)	N		5.28	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Volatile Organic Compounds (VOC)	N		0.28	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Volatile Organic Compounds (VOC)	N		0.28	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Volatile Organic Compounds (VOC)	N		0.28	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Volatile Organic Compounds (VOC)	N		0.28	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Volatile Organic Compounds (VOC)	N		0.28	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUDUCTINOC (Ductile Inoculation)	81.43	0		Volatile Organic Compounds (VOC)	N		0.28	LB/H	0	U
WI-0236	THYSSEN KRUPP PLANT #4	DISA LINES #4 & #5	81.44			Volatile Organic Compounds (VOC)	N		0.6	LB/T	0	U
WI-0236	THYSSEN KRUPP PLANT #4	DISA LINES #4 & #5	81.44			Volatile Organic Compounds (VOC)	N		0.6	LB/T	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGCORECHEM (Core Washing)	81.44	0		Volatile Organic Compounds (VOC)	N		1.43	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGCORECHEM (Core Washing)	81.44	0		Volatile Organic Compounds (VOC)	N		1.43	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGCORECHEM (Core Washing)	81.44	0		Volatile Organic Compounds (VOC)	N		1.43	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGCORECHEM (Core Washing)	81.44	0		Volatile Organic Compounds (VOC)	N		1.43	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGCORECHEM (Core Washing)	81.44	0		Volatile Organic Compounds (VOC)	N		1.43	LB/H	0	N
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MOLD MACHINE AND SAND HANDLING (EU-SS)	81.44			Volatile Organic Compounds (VOC)	N		4	LB/H	0	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MOLD MACHINE AND SAND HANDLING (EU-SS)	81.44			Volatile Organic Compounds (VOC)	N		4	LB/H	0	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	MOLD MACHINE AND SAND HANDLING (EU-SS)	81.44			Volatile Organic Compounds (VOC)	N		4	LB/H	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Volatile Organic Compounds (VOC)	N		1.83	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Volatile Organic Compounds (VOC)	N		1.83	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Volatile Organic Compounds (VOC)	N		1.83	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Volatile Organic Compounds (VOC)	N		1.83	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUSHELLCM	81.44	0		Volatile Organic Compounds (VOC)	N		1.83	LB/H	0	N
IN-0165	HARRISON STEEL CASTINGS COMPANY	AIRSET MOLD LINE ENCLOSED MOLD SAND MIXER	81.44	47.2	T/H OF SAND	Volatile Organic Compounds (VOC)	A	THERMAL SAND RECLAMATION SYSTEM, NO DESTRUCTION EFFICIENCY	2.2	LB/H	97.2	
IN-0165	HARRISON STEEL CASTINGS COMPANY	AIRSET MOLD LINE ENCLOSED MOLD SAND MIXER	81.44	47.2	T/H OF SAND	Volatile Organic Compounds (VOC)	A	THERMAL SAND RECLAMATION SYSTEM, NO DESTRUCTION EFFICIENCY	2.2	LB/H	97.2	
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Volatile Organic Compounds (VOC)	N		14.47	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Volatile Organic Compounds (VOC)	N		14.47	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Volatile Organic Compounds (VOC)	N		14.47	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Volatile Organic Compounds (VOC)	N		14.47	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUPNBCM	81.44	0		Volatile Organic Compounds (VOC)	N		14.47	LB/H	0	N
IN-0136	THYSSENKRUPP WAPUPACA, INC.	CASTING LINES 1-8	81.45	200	T/H COMBINED	Volatile Organic Compounds (VOC)	N	MOLD VENT OFF GAS IGNITION	0		50	U
IN-0136	THYSSENKRUPP WAPUPACA, INC.	CASTING LINES 1-8	81.45	200	T/H COMBINED	Volatile Organic Compounds (VOC)	N	MOLD VENT OFF GAS IGNITION	0		50	U
WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Volatile Organic Compounds (VOC)	N		0.5	LB/T	0	U
WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Volatile Organic Compounds (VOC)	N		0.5	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.5	POUNDS/TON OF METAL	0	U

WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Volatile Organic Compounds (VOC)	N		0.5	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.5	POUNDS/TON OF METAL	0	U
WI-0238	THYSSEN KRUPP PLANT #1	POURING/COOLING	81.45			Volatile Organic Compounds (VOC)	N		0.5	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P57 - Line 5 Pouring/Mold Cooling	81.45	20	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.5	POUNDS/TON OF METAL	0	U
IN-0257	INTAT PRECISION, INC.	CASTING LINE 2	81.45	15	T/H OF METAL	Volatile Organic Compounds (VOC)	P	MOLD VENT OFF-GAS IGNITION SYSTEM	1.2	LB/T OF METAL	0	U
IN-0288	WAUPACA FOUNDRY, INC. PLANT 5	Casting Lines 1, 5, 7	81.45	43	T/H	Volatile Organic Compounds (VOC)	N		1.4	LB/TON	0	U
IA-0104	JOHN DEERE FOUNDRY WATERLOO	804 Sand System	81.45	61.33	T/H OF METAL	Volatile Organic Compounds (VOC)	N		8	PPMV	0	N
IA-0104	JOHN DEERE FOUNDRY WATERLOO	804 Sand System	81.45	61.33	T/H Metal	Volatile Organic Compounds (VOC)	N		8	PPMV	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL (pouring and cooling for both production lines)	81.45	0		Volatile Organic Compounds (VOC)	N		34.75	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL (pouring and cooling for both production lines)	81.45	0		Volatile Organic Compounds (VOC)	N		34.75	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL (pouring and cooling for both production lines)	81.45	0		Volatile Organic Compounds (VOC)	N		34.75	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL (pouring and cooling for both production lines)	81.45	0		Volatile Organic Compounds (VOC)	N		34.75	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGPOURCOOL (pouring and cooling for both production lines)	81.45	0		Volatile Organic Compounds (VOC)	N		34.75	LB/H	0	N
IN-0165	HARRISON STEEL CASTINGS COMPANY	AIRSET MOLD LINE POURING AND CASTINGS COOLING OPERATIONS	81.45	15.73	T/H OF METAL	Volatile Organic Compounds (VOC)	N		1.8	LB/T METAL POURED	0	
IN-0165	HARRISON STEEL CASTINGS COMPANY	AIRSET MOLD LINE POURING AND CASTINGS COOLING OPERATIONS	81.45	15.73	T/H OF METAL	Volatile Organic Compounds (VOC)	N		1.8	LB/T METAL POURED	0	
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Volatile Organic Compounds (VOC)	N		0.1	LB/T	0	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Volatile Organic Compounds (VOC)	N		0.1	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.1	POUNDS/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.1	POUNDS/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.1	POUNDS/TON OF METAL	0	U
WI-0238	THYSSEN KRUPP PLANT #1	SHAKEOUT	81.46			Volatile Organic Compounds (VOC)	N		0.1	LB/T	0	U
WI-0239	THYSSEN KRUPP PLANTS #2 AND #3	SHAKEOUT	81.46			Volatile Organic Compounds (VOC)	N		0.1	LB/T	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P61 - Line 3 Shakeout	81.46	16	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.1	POUNDS/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P62 - Line 4 Shakeout	81.46	16	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.1	POUNDS/TON OF METAL	0	U
WI-0256	WAUPACA FOUNDRY, INC. - PLANT 2/3	P63 - Line 5 Shakeout	81.46	20	T/H OF METAL	Volatile Organic Compounds (VOC)	N		0.1	POUNDS/TON OF METAL	0	U
IN-0188	WAUPACA FOUNDRY, INC PLANT 5	LINE 4 POURING/MOLD COOLING AND SHAKEOUT	81.46	40	T/H	Volatile Organic Compounds (VOC)	P	CONTROLLED BY A MOLD VENT OFF GAS IGNITION	1.4	LB/T OF IRON	0	
IN-0188	WAUPACA FOUNDRY, INC PLANT 5	LINE 4 POURING/MOLD COOLING AND SHAKEOUT	81.46	40	T/H	Volatile Organic Compounds (VOC)	P	CONTROLLED BY A MOLD VENT OFF GAS IGNITION	1.4	LB/T OF IRON	0	
IN-0143	THYSSENKRUPP WAUPACA, INC. PLANT 5	CASTING LINES(1-4)	81.46	0		Volatile Organic Compounds (VOC)	N		1.9	LB/T OF IRON*	0	U
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Volatile Organic Compounds (VOC)	N		14.78	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Volatile Organic Compounds (VOC)	N		14.78	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Volatile Organic Compounds (VOC)	N		14.78	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Volatile Organic Compounds (VOC)	N		14.78	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGSHAKEOUT	81.46	0		Volatile Organic Compounds (VOC)	N		14.78	LB/H	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Volatile Organic Compounds (VOC)	A	Each engine is a certified engine with associated required controls.	1	G/HP-H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Volatile Organic Compounds (VOC)	A	Each engine is a certified engine with associated required controls.	1	G/HP-H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Volatile Organic Compounds (VOC)	A	Each engine is a certified engine with associated required controls.	1	G/HP-H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Volatile Organic Compounds (VOC)	A	Each engine is a certified engine with associated required controls.	1	G/HP-H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGEG (Emergency engines)	81.49	0		Volatile Organic Compounds (VOC)	A	Each engine is a certified engine with associated required controls.	1	G/HP-H	99	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Volatile Organic Compounds (VOC)	N		5.5	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Volatile Organic Compounds (VOC)	N		5.5	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDIPTANK	81.49	0		Volatile Organic Compounds (VOC)	N		15.2	T/YR	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDIPTANK	81.49	0		Volatile Organic Compounds (VOC)	N		15.2	T/YR	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDIPTANK	81.49	0		Volatile Organic Compounds (VOC)	N		15.2	T/YR	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDIPTANK	81.49	0		Volatile Organic Compounds (VOC)	N		15.2	T/YR	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	EUDIPTANK	81.49	0		Volatile Organic Compounds (VOC)	N		15.2	T/YR	0	N

MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Volatile Organic Compounds (VOC)	N		5.5	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Volatile Organic Compounds (VOC)	N		5.5	LB/MMSCF	0	N
MI-0429	EAST JORDAN FOUNDRY LLC	FGNATGASUNITS	81.49	0		Volatile Organic Compounds (VOC)	N		5.5	LB/MMSCF	0	N
IA-0104	JOHN DEERE FOUNDRY WATERLOO	Cooling Shed	81.49	61.33	T/H OF METAL	Volatile Organic Compounds (VOC)	N		8	PPMV	0	N
IA-0104	JOHN DEERE FOUNDRY WATERLOO	Cooling Shed	81.49	61.33	T/H Metal	Volatile Organic Compounds (VOC)	N		8	PPMV	0	N
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	AUTOMATED MOLD COOLING CONVEYOR SYSTEM AND SHAKEOUT LINES	81.49			Volatile Organic Compounds (VOC)	N		15.49	LB/H	0	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	AUTOMATED MOLD COOLING CONVEYOR SYSTEM AND SHAKEOUT LINES	81.49			Volatile Organic Compounds (VOC)	N		15.49	LB/H	0	U
MI-0385	ASAMA COLDWATER MANUFACTURING, INC.	AUTOMATED MOLD COOLING CONVEYOR SYSTEM AND SHAKEOUT LINES	81.49			Volatile Organic Compounds (VOC)	N		15.49	LB/H	0	U
IN-0227	METAL TECHNOLOGIES AUBURN, LLC	NATURAL GAS-FIRED THERMAL CHIP DRYER	81.49	15	T/H METAL CHIPS	Volatile Organic Compounds (VOC)	A	THERMAL OXIDIZER	98	% OVERALL CONTROL	98	

Table 5-15. VOC Control Technology Cost Effectiveness - Melt Baghouse (CU01/ST02)

Control Device ID Stack ID	Pollutant	Control Technology	Total Annualized Cost ($)	Pollutant Removed (tpy)	Cost Effectiveness ($/ton removed)
CU01 ST02	VOC	Fixed Bed Catalytic Oxidizer	4,740,304	9.0	527,972.00
CU01 ST02	VOC	Regenerative Thermal Oxidizer	2,489,174	9.0	277,243.00
CU01 ST02	CO VOC	Fixed Bed Catalytic Oxidizer	4,736,599	66.9	70,788.00
CU01 ST02	CO VOC	Regenerative Thermal Oxidizer	2,485,499	66.9	37,145.00

Table 5-16. VOC Control Technology Cost Effectiveness - Sand Plant Baghouse (CU06/ST07)

Control Device ID Stack ID	Pollutant	Control Technology	Total Annualized Cost ($)	Pollutant Removed (tpy)	Cost Effectiveness ($/ton removed)
CU06 ST07	VOC	Fixed Bed Catalytic Oxidizer	3,224,448	22.4	143,777.00
CU06 ST07	VOC	Regenerative Thermal Oxidizer	1,694,120	22.4	75,540.00
CU06 ST07	CO VOC	Fixed Bed Catalytic Oxidizer	3,224,249	41.2	78,306.00
CU06 ST07	CO VOC	Regenerative Thermal Oxidizer	1,692,931	41.2	41,128.00

Table 5-17. VOC Control Technology Cost Effectiveness - Core/Mold Baghouse (CU08/ST09)

Control Device ID Stack ID	Pollutant	Control Technology	Total Annualized Cost ($)	Pollutant Removed (tpy)	Cost Effectiveness ($/ton removed)
CU08 ST09	VOC	Fixed Bed Catalytic Oxidizer	3,460,698	129.6	26,709.00
CU08 ST09	VOC	Regenerative Thermal Oxidizer	1,820,875	129.6	14,053.00
CU08 ST09	CO VOC	Fixed Bed Catalytic Oxidizer	3,446,178	356.6	9,665.00
CU08 ST09	CO VOC	Regenerative Thermal Oxidizer	1,820,848	356.6	5,106.00

Table 5-18. VOC Control Technology Cost Effectiveness - Acid Scrubber (CU07/ST08)

Control Device ID Stack ID	Pollutant	Control Technology	Total Annualized Cost ($)	Pollutant Removed (tpy)	Cost Effectiveness ($/ton removed)
CU07 ST08	VOC	Fixed Bed Catalytic Oxidizer	378,304	14.0	27,101.00
CU07 ST08	VOC	Regenerative Thermal Oxidizer	292,849	14.0	20,979.00
CU07 ST08	VOC	Recuperative Thermal Oxidizer	525,103	14.0	37,618.00

Table 5-19. VOC Control Technology Cost Effectiveness - Paint Line Operations

Emission Unit ID	Emission Unit Description	Control Technology	Uncontrolled Emission Rate (tpy)[1]	DRE (%)	Total Annualized Cost ($)	Pollutants Removed (tpy)	Cost Effectiveness ($/ton removed)
EU68 EU69 EU71	Paint Line #3 Paint Line #2 Paint Line #1	Biofilter	26	62	433,073.00	10.00	43,307
EU68 EU69 EU71	Paint Line #3 Paint Line #2 Paint Line #1	Activated Carbon with Regeneration	26	90	686,964.00	14.5	47,377
EU68 EU69 EU71	Paint Line #3 Paint Line #2 Paint Line #1	Regenerative Thermal Oxidizer	26	95	363,845.00	15.3	23,788

[1]Uncontrolled emission rate from previously 2017 permit revision presented (CY2025 permit revision VOC PTE is 29.24)

Table 5-20. Alternate Facility VOC and PM Control Technologies - Paint Line Operations

Foundry	Location	Uncontrolled VOC Emission Rate (tpy)	VOC Control Technology	PM Control Technology
NIBCO	Blytheville, AR	31	None	Fabric Filter
Asama	Coldwater, MI	30	None	Fabric Filter
Brembo	Homer, MI	43.5	None	Fabric Filter

Table 5-21. BACT Determinations - Volatile Organic Compounds

Emission Unit	Description	BACT for VOC	BACT Justification
EU07	Induction Furnace #1	0.234 lb/ton metal 2.341 lb/hr 2.341 ton/yr	The RBLC contains no identified of emission control for this process. Two RBLC determinations are less than the proposed BACT. This first emission rate is 0.84 lb/hr [MI-0429]) and another entry has an emission rate exceeding the proposed BACT but is for both melting and pouring operations (5.28 lb/hr [MI-0385]). It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU08	Induction Furnace #2	0.234 lb/ton metal 2.341 lb/hr 2.341 ton/yr	The RBLC contains no identified of emission control for this process. Two RBLC determinations are less than the proposed BACT. This first emission rate is 0.84 lb/hr [MI-0429]) and another entry has an emission rate exceeding the proposed BACT but is for both melting and pouring operations (5.28 lb/hr [MI-0385]). It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU09	Induction Furnace #3	0.234 lb/ton metal 2.341 lb/hr 2.341 ton/yr	The RBLC contains no identified of emission control for this process. Two RBLC determinations are less than the proposed BACT. This first emission rate is 0.84 lb/hr [MI-0429]) and another entry has an emission rate exceeding the proposed BACT but is for both melting and pouring operations (5.28 lb/hr [MI-0385]). It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU10	Induction Furnace #4	0.234 lb/ton metal 2.341 lb/hr 2.341 ton/yr	The RBLC contains no identified of emission control for this process. Two RBLC determinations are less than the proposed BACT. This first emission rate is 0.84 lb/hr [MI-0429]) and another entry has an emission rate exceeding the proposed BACT but is for both melting and pouring operations (5.28 lb/hr [MI-0385]). It appears the MI-0429 is likely equivalent to 0.33 lb/ton metal but the exhaust gases are mixed with other processes.
EU39	PUCB Core Machine #1	4.298 lb/hr 7.862 ton/yr	For this process there is no RBLC determination less than the proposed BACT and no control method identified. Emissions are going to be dependent on binder technology used. It appears only the entries for MI-0429 is using a similar binder technology and has an emission rate of 14.47 lb/hr.
EU40	PUCB Core Machine #2	4.298 lb/hr 7.862 ton/yr	For this process there is no RBLC determination less than the proposed BACT and no control method identified. Emissions are going to be dependent on binder technology used. It appears only the entries for MI-0429 is using a similar binder technology and has an emission rate of 14.47 lb/hr.
EU43	Core Wash Station #1	0.675 lb/hr 0.135 ton/yr	For this process there is no RBLC determination less than the proposed BACT and no control method identified. Emissions are going to be dependent on binder technology used. It appears only the entries for MI-0429 is using a similar binder technology and has an emission rate of 1.43 lb/hr.
EU50	Pouring #1	3.54 lb/ton metal 53.101 lb/hr 141.604 ton/yr	For this process there is no RBLC determination less than the proposed BACT and the only control method identified is "mold vent off gas ignition." There are two RBLC entries of 0.5 lb/ton metal [WI-0238, WI-0256) and 1.8 lb/ton metal which is a chemically bonded mold [IN-0165]. In addition there are two entries for a total emission rate of 1.2 blt/on [IN-0257] and 1.4 lb/ton [IN-0288]. The equivalent emission rate for FWNA is 1.028 lb/ton metal which is less than both of these values.
EU52	Mold Cooling	See EU50 and EU51	See EU50 and EU51
EU53	Shakeout Conveyor	0.616 lb/ton metal 9.240 lb/hr 24.640 ton/yr	For this process there is one RBLC determination less than the proposed BACT and the only control method identified is "mold vent off gas ignition." WI-0238 and WI-0256 have emission rates of 0.1 lb/ton metal. RBLC lists the compliance demonstration as unknown. The facility has been contacted and verified that they cannot meet this emission rate. In addition there are four entries for a total emission rate of 1.2 blt/on [IN-0257], 1.4 lb/ton [IN-0288], 1.4 lb/ton metal [IN-0188] and 1.9 lb/ton metal. The equivalent emission rate for FWNA is 1.028 lb/ton metal which is less than all four of these values.
EU68	Paint Line #3	3.43 lb/hr 13.72 ton/yr	For this process, there were no RBLC determination under either iron and/or steel foundries. For miscellaneous metal parts and products [process id 81.44] only the FWNA was identified. Cost effectiveness analysis supports the identified emission rates as BACT.

EU69	Paint Line #2	3.43 lb/hr 13.72 ton/yr	For this process, there were no RBLC determination under either iron and/or steel foundries. For miscellaneous metal parts and products [process id 81.44] only the FWNA was identified. Cost effectiveness analysis supports the identified emission rates as BACT.
EU71	Paint Line #1	0.992 lb/hr 1.804 ton/yr	For this process, there were no RBLC determination under either iron and/or steel foundries. For miscellaneous metal parts and products [process id 81.44] only the FWNA was identified. Cost effectiveness analysis supports the identified emission rates as BACT.
EU75	Diesel Storage Tank	0.918 lb/hr 0.069 ton/yr	The diesel storage tank shall be equipped with a permanent submerged fill pipe.
EU79	Core Wash Station #2	0.675 lb/hr 0.135 ton/yr	For this process there is no RBLC determination less than the proposed BACT and no control method identified. Emissions are going to be dependent on binder technology used. It appears only the entries for MI-0429 is using a similar binder technology and has an emission rate of 1.43 lb/hr.
EU82	Rust Preventative Application	2.500 lb/hr 1.000 ton/yr	For this process, there were no RBLC determination under either iron and/or steel foundries. For miscellaneous metal parts and products [process id 81.44] only the FWNA was identified. Emission rate could be supported by cost-effectiveness analysis.

Table 6-1. SMC, SIL, NAAQS and Increment Concentrations

Pollutant	Averaging Period	Significant Monitoring Concentration[a,k] (µg/m^3)	Class II SIL[e,g,k] (µg/m^3)	Primary NAAQS (µg/m3)	PSD Class II Increment[f] (µg/m^3)
PM_{10}	24-hour	10	5	150[b]	30[j]
	Annual	NA	1	Revoked[c]	17[k]
$PM_{2.5}$	24-hour	4[d]	1.2	35[h]	9[j]
	Annual	0	0.13	9[i]	4[k]
CO[f]	1-hour	NA	2000	40000[j] (35 ppm)	-
	8-hour	575	500	10000[j] (9 ppm)	-

[a]401 KAR 51:017 Section 7(5)(a) and 40 CFR 52.21(i)(5)(i). See footnote d.

[b]Not to be exceeded more than three times in three consecutive years (H6H for all 5 years modeled together).

[c]Primary and secondary annual PM10 NAAQS of 50 µg/m3 was revoked effective 12/18/2006 [71 FR 6114].

[d]$PM_{2.5}$ SMC determined not authorized by CAA (court decision June 23, 2016), but EPA retains the argument that value can be used as part of an overall monitoring assessment.

[e]401 KAR 51:017 Section 9(2). See footnote g.

[f]401 KAR 51:017 Section 2(1).

[g]USEPA document "Guidance on SIL for Ozone and Fine Particles in PSD Permitting Program" (4/17/2018) identifies annual $PM_{2.5}$ Class II SIL value of 0.2 µg/m^3.

[h]3-year average of the 98th percentile 24-hour average concentration (H8H for each 1-year, 5 separate model runs are averaged together).

[i]3-year average of the annual arithmetic average concetnrations (H1H for each 1-year, 5 spearate model runs are averaged together).

[j]The maximum of the second highest 1-year concentration, 5 separate runs, maximum of the H2H concentrations.

[k]Single highest concentration during the 5-year modeling period.

Table 6-2. FWNA Air Dispersion Modeling Parameters

Stack ID	X Coord (m)	Y Coord (m)	$PM_{10}/PM_{2.5}$ Emission Rate (lb/hr)	CO Emission Rate (lb/hr)	Stack Height		Stack Diameter		Stack Temperature		Stack Velocity		Air Volume (cfm)	Stack Orientation
					(m)	(ft)	(m)	(ft)	(°K)	(°F)	(m/s)	(fps)		
ST02	539906	4072425	1.982	57.58	35.0	114.8	2.54	8.33	305	90	14.9	48.9	160000	V
ST03	539903	4072413	0.015	0.00	17.0	55.8	0.30	1.00	294	70	3.9	12.7	600	H
ST04	539904	4072404	0.015	0.00	22.0	72.2	0.30	1.00	294	70	3.9	12.7	600	H
ST05	539906	4072407	0.015	0.00	22.0	72.2	0.30	1.00	294	70	3.9	12.7	600	H
ST06	539908	4072411	0.015	0.00	22.0	72.2	0.30	1.00	294	70	3.9	12.7	600	H
ST07	539888	4072396	1.750	7.73	40.0	131.2	2.03	6.67	303	85	15.3	50.1	105000	V
ST08	539822	4072517	0.032	0.00	26.0	85.3	0.97	3.17	300	80	4.8	15.9	15000	V
ST09	539816	4072488	1.425	93.15	43.0	141.1	1.97	6.46	305	90	17.8	58.5	115000	V
ST11	539901	4072410	0.015	0.00	17.1	56.0	0.30	1.00	294	70	3.9	12.7	600	H
ST12	539832	4072331	0.552	0.00	30.0	98.4	1.52	5.00	297	75	16.8	55.2	65000	V
ST13	539899	4072407	0.015	0.00	17.0	55.8	0.30	1.00	294	70	3.9	12.7	600	H
ST15A	539708	4072441	0.050	0.00	14.2	46.6	0.41	1.33	305	90	10.0	32.8	2750	VO
ST15B	539704	4072435	0.064	0.00	14.2	46.6	0.41	1.35	305	90	12.3	40.5	2750	VO
ST16	539698	4072424	0.587	0.00	14.0	45.9	0.87	2.84	305	90	16.3	53.4	20310	V

Table 6-3. Results of SIL Modeling Analysis

Pollutant	Averaging Period	Resulting Concentration ($\mu g/m^3$)	Class II SIL ($\mu g/m^3$)	Exceed SIL (Y/N)?	Modeled Percentage of SIL (%)
PM_{10}	24-hour	10.50	5	Y	210.0%
	Annual	1.86	1	Y	186.0%
$PM_{2.5}$	24-hour	10.50	1.2	Y	875.0%
	Annual	1.86	0.13	Y	1430.8%
CO^f	1-hour	398.37	2000	N	19.9%
	8-hour	208.19	500	N	41.6%

Table 6-4. Results of SMC Modeling Analysis

Pollutant	Averaging Period	Resulting Concentration ($\mu g/m^3$)	Significant Monitoring Concentration ($\mu g/m^3$)	Exceed SMC (Y/N)?	Modeled Percentage of SMC (%)
PM_{10}	24-hour	10.50	10	Y	105.0%
	Annual	NA	NA	NA	NA
$PM_{2.5}$	24-hour	10.50	4	Y	262.5%
	Annual	NA	0	NA	NA
CO^f	1-hour	NA	NA	NA	NA
	8-hour	208.19	575	N	36.2%

Table 6-5. Background Concentrations for PM_{10} and $PM_{2.5}$ NAAQS and PSD Increment Air Quality Analysis

Pollutant	Averaging Period	Monitor Background Concentration ($\mu g/m^3$)	Metric	Monitor Location
PM_{10}	24-hour	60.00	3-year average of second-high	Evansville-Buena Vista Monitor (AQS Site ID 18-163-0021) 1110 W. Buena Vista Rd. Evansville, IN
$PM_{2.5}$	24-hour	17.90	3-year average of 98th percentile	Smiths Grove (AQS Site ID 227-0009) 226 Sunset Street Bowling Green, KY
	Annual	6.90	3-year arithmetic mean average	

Table 6-6. Evaluation of PM_{10} Background Monitoring Locations

Monitoring Location	AQS ID	Distance to FWNA (km)	Elevation (m)	Wind Orientation	Data Completeness	Rural or Urban	Land Use Similarities	Terrain	Notes
FWNA			199			Rural	Ag, Rural Res., Ind. Parks	Gently rolling	
Nashville, TN	47-037-0023	72	160	Upwind/Crosswind	High	Urban	Moderate	Moderate	Closest; reasonably aligned
Evansville, IN	18-163-0021	160	116	Crosswind	High	Urban	High	High	Good terrrian and land use match
Louisville, KY	21-111-1041	175	137	Downwind	High	Urban	Moderate	Moderate	Less ideal wind orienttations
Jeffersonville, IN	18-019-0010	200	107	Downwind	Medium	Urban	Moderate	Moderate	Weak data completeness; Less Ideal wind orientation
Lexington, KY	21-067-0012	300	302	Downwind	Medium	Urban	Low	High	Far; Land use mismatch
Memphis, TN	47-157-0024	370	83	Upwind/Crosswind	Medium	Urban	Low	Low	Too far for regional reprsentativness
Knoxville, TN	47-093-1013	260	277	Crosswind	Excellent	Urban	Moderate	Low	Higher elevation, more variable land use

Table 6-7. Background 24-hour PM10 Concentration Development (Evansville, IN)

Year	Second High 24-Hour Concentration (µg/m3)
2022	81
2023	53
2024	46
Average	**60**

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Table 6-8. Offsite Source PM_{10} NAAQS Modeling Parameters

												Column 2 Information				Table 8-2 Col 2		Table 8-2 Col 3	PM10 NAAQS Modeled Emission Rates												
Facility ID	AI ID	Facility Name	County	Subject Item Designation	Distance from Site Center (km)	Distance from Facility to Site Center < 50 km	Pollutant	Estimated Emissions (ton/year)	PTE Emissions (tons/yr)	PTE Emissions (lbs/hr)	2023 Actual Emissions (tons/yr)	2023 Hours of Operation	2024 Actual Emissions (tons/yr)	2024 Hours of Operation	2023 Operating Level	2024 Operating Level	24-Hour Operating Factor (hr/day)	24 hour Emission Rate (lb/day)	24 hour Emission Rate (lb/hr)	Easting	Northing	Stack Diameter (ft)	Stack Height (ft)	Stack Flow Rate (cfm)	Stack Velocity (ft/sec)	Temp (F)	Plume Height (ft)	Construction Date	Emissions Document	Comments (see 2024 air permit)
2121300059	107116	RKW North America Inc	Simpson	RKW-1	0.823	Y	PM10 (Particulate Matter - 10 Microns Or Less)	0.04993200	0.0499	0.0114	0.0489	8760.0000	0.0489	8760.0000	98%	98%	24	0.2682	0.0112	539430.28	4071698.71	**2**	**40**	**4120**	**39**	**1500**	**0**	**04/19/2014**	**2019 Emissions Survey**	EU001 RTO Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-1	0.823	Y	PM10 (Particulate Matter - 10 Microns Or Less)	0.04993200	0.0698	0.0159	0.0698	8760.0000	0.0698	8760.0000	100%	100%	24	0.3827	0.0159	539430.28	4071698.71	0	0	0	0	77	40	04/19/2014	2019 Emissions Survey	EU001 RTO Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM10 (Particulate Matter - 10 Microns Or Less)	0.04993200	0.0555	0.0127	0.0555	8760.0000	0.0555	8760.0000	100%	100%	24	0.3040	0.0127	539430.28	4071698.71	2.3	33	15000	60.17	122	0	09/16/2019	2019 Emissions Survey	EU06_EU09 RTO #4 Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM10 (Particulate Matter - 10 Microns Or Less)	0.04993200	0.0555	0.0127	0.0000	8760.0000	0.0000	8760.0000	0%	0%	24	0.0000	0.0000	539430.28	4071698.71	2.3	33	15000	60.17	122	0	01/01/2022	2019 Emissions Survey	EU06_EU09 RTO #4 Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-1	0.823	Y	PM10 (Particulate Matter - 10 Microns Or Less)	0.04993200	0.0698	0.0159	0.0698	8760.0000	0.0698	8760.0000	100%	100%	24	0.3827	0.0159	539430.28	4071698.71	0	0	0	0	77	40	04/19/2014	2019 Emissions Survey	EU001 RTO Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM10 (Particulate Matter - 10 Microns Or Less)	0.04993200	0.0644	0.0147	0.0644	8760.0000	0.0644	8760.0000	100%	100%	24	0.3531	0.0147	539430.28	4071698.71	2.3	33	15000	60.17	122	0	09/16/2019	2019 Emissions Survey	EU06_EU09 RTO #4 Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM10 (Particulate Matter - 10 Microns Or Less)	0.04993200	0.0644	0.0147	0.0000	8760.0000	0.0000	8760.0000	0%	0%	24	0.0000	0.0000	539430.28	4071698.71	2.3	33	15000	60.17	122	0	01/01/2022	2019 Emissions Survey	EU06_EU09 RTO #4 Stack
																		RKW-1	0.0431	539430.28	4071698.71	1.5	40.00	4120.00	38.86	1500	0.0			EU001 RTO Stack
																		RKW-2	0.0274	539431.28	4071699.71	2.3	33.0	15000.0	60.2	122.0	0.0			EU06_EU09 RTO #4 Stack

Table 6-9. Offsite Source $PM_{2.5}$ NAAQS Modeling Parameters

									Table 8-2 Col 1		Column 2 Information				Table 8-2 Col 2		Table 8-2 Col 3	PM10 NAAQS Modeled Emission Rates										
Facility ID	AI ID	Facility Name	County	Subject Item Designation	Distance from Site Center (km)	Distance from Facility to Site Center < 50 km	Pollutant	Estimated Emissions (ton/year)	PTE Emissions (tons/yr)	PTE Emissions (lbs/hr)	2023 Actual Emissions (tons/yr)	2023 Hours of Operation	2024 Actual Emissions (tons/yr)	2024 Hours of Operation	2023 Operating Level	2024 Operating Level	24-Hour Operating Factor (hr/day)	24 hour Emission Rate (lb/day)	24 hour Emission Rate (lb/hr)	Easting	Northing	Stack Diameter (ft)	Stack Height (ft)	Stack Flow Rate (cfm)	Stack Velocity (ft/sec)	Temp (F)	Plume Height (ft)	Construction Date	Emissions Document	Comments (see 2024 air permit)
2121300059	107116	RKW North America Inc	Simpson	RKW-1	0.823	Y	PM2.5 (Particulate Matter - 2.5 Microns Or Less)	0.04993200	0.0125	0.0029	0.0122	8760.0000	0.0122	8760.0000	98%	98%	24	0.0670	0.0028	539430.28	4071698.71	1.5	40.00	4120	38.86	1500	0.00	04/19/2014	2019 Emissions Survey	EU001 RTO Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-1	0.823	Y	PM2.5 (Particulate Matter - 2.5 Microns Or Less)	0.04993200	0.0175	0.0040	0.0175	8760.0000	0.0175	8760.0000	100%	100%	24	0.0957	0.0040	539430.28	4071698.71	0.0	0.00	0	0.00	77	40.00	04/19/2014	2019 Emissions Survey	EU001 RTO Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM2.5 (Particulate Matter - 2.5 Microns Or Less)	0.04993200	0.0139	0.0032	0.0139	8760.0000	0.0139	8760.0000	100%	100%	24	0.0760	0.0032	539430.28	4071698.71	2.3	33.00	15000	60.17	122	0.00	09/16/2019	2019 Emissions Survey	EU06_EU09 RTO #4 Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM2.5 (Particulate Matter - 2.5 Microns Or Less)	0.04993200	0.0139	0.0032	0.0000	8760.0000	0.0000	8760.0000	0%	0%	24	0.0000	0.0000	539430.28	4071698.71	2.3	33.00	15000	60.17	122	0.00	01/01/2022	2019 Emissions Survey	EU06_EU09 RTO #4 Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-1	0.823	Y	PM2.5 (Particulate Matter - 2.5 Microns Or Less)	0.04993200	0.0175	0.0040	0.0175	8760.0000	0.0175	8760.0000	100%	100%	24	0.0957	0.0040	539430.28	4071698.71	0.0	0.00	0	0.00	77	40.00	04/19/2014	2019 Emissions Survey	EU001 RTO Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM2.5 (Particulate Matter - 2.5 Microns Or Less)	0.04993200	0.0161	0.0037	0.0161	8760.0000	0.0161	8760.0000	100%	100%	24	0.0883	0.0037	539430.28	4071698.71	2.3	33.00	15000	60.17	122	0.00	09/16/2019	2019 Emissions Survey	EU06_EU09 RTO #4 Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM2.5 (Particulate Matter - 2.5 Microns Or Less)	0.04993200	0.0161	0.0037	0.0000	8760.0000	0.0000	8760.0000	0%	0%	24	0.0000	0.0000	539430.28	4071698.71	2.3	33.00	15000	60.17	122	0.00	01/01/2022	2019 Emissions Survey	EU06_EU09 RTO #4 Stack

RKW-1	0.0108	539430.28	4071698.71	1.5	40.00	4120.00	38.86	1500	0.0000				EU001 RTO Stack
RKW-2	0.0068	539431.28	4071699.71	2.3	33.0	15000.0	60.2	122.0	0.0				EU06_EU09 RTO #4 Stack

Table 6-10. Results of PM_{10} and $PM_{2.5}$ NAAQS Analysis

Pollutant	Averaging Period	Primary NAAQS (µg/m3)	Background Concentration (µg/m^3)	Modeled Resulting Concentration (µg/m^3)	Background + Modeled Concentration (µg/m3)	% of Primary NAAQS
PM_{10}	24-hour	150	60.00	8.14	68.14	45%
$PM_{2.5}$	24-hour	35	17.90	6.81	24.71	71%
	Annual	9	6.90	1.86	8.76	97%

Table 6-11. Offsite Source PM_{10} PSD Increment Modeling Parameters

												Column 2 Information				Table 8-2 Col 2		Table 8-2 Col 3	PM10 NAAQS Modeled Emission Rates												
Facility ID	AI ID	Facility Name	County	Subject Item Designation	Distance from Site Center (km)	Distance from Facility to Site Center < 50 km	Pollutant	Estimated Emissions (ton/year)	PTE Emissions (tons/yr)	PTE Emissions (lbs/hr)	2023 Actual Emissions (tons/yr)	2023 Hours of Operation	2024 Actual Emissions (tons/yr)	2024 Hours of Operation	2023 Operating Level	2024 Operating Level	24-Hour Operating Factor (hr/day)	24 hour Emission Rate (lb/day)	24 hour Emission Rate (lb/hr)	Easting	Northing	Stack Diameter (ft)	Stack Height (ft)	Stack Flow Rate (cfm)	Stack Velocity (ft/sec)	Temp (F)	Plume Height (ft)	Construction Date	Emissions Document	Comments (see 2024 air permit)
2121300059	107116	RKW North America Inc	Simpson	RKW-1	0.823	Y	PM10 (Particulate Matter - 10 Microns Or Less)	0.04993200	0.0499	0.0114	0.0489	8760.0000	0.0489	8760.0000	98%	98%	24	0.2682	0.0112	539430.28	4071698.71	1.5	40.00	4120	38.86	1500	0.00	04/19/2014	2019 Emissions Survey	EU001 RTO Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM10 (Particulate Matter - 10 Microns Or Less)	0.04993200	0.0698	0.0159	0.0698	8760.0000	0.0698	8760.0000	100%	100%	24	0.3827	0.0159	539430.28	4071698.71	0.0	0.00	0	0.00	77	40.00	04/19/2014	2019 Emissions Survey	EU001 RTO Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM10 (Particulate Matter - 10 Microns Or Less)	0.04993200	0.0555	0.0127	0.0555	8760.0000	0.0555	8760.0000	100%	100%	24	0.3049	0.0127	539430.28	4071698.71	2.3	33.00	15000	60.17	122	0.00	09/16/2019	2019 Emissions Survey	EU06_EU09 RTO #4 Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM10 (Particulate Matter - 10 Microns Or Less)	0.04993200	0.0555	0.0127	0.0000	8760.0000	0.0000	8760.0000	0%	0%	24	0.0000	0.0000	539430.28	4071698.71	2.3	33.00	15000	60.17	122	0.00	01/01/2022	2019 Emissions Survey	EU06_EU09 RTO #4 Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM10 (Particulate Matter - 10 Microns Or Less)	0.04993200	0.0698	0.0159	0.0698	8760.0000	0.0698	8760.0000	100%	100%	24	0.3827	0.0159	539430.28	4071698.71	0.0	0.00	0	0.00	77	40.00	04/19/2014	2019 Emissions Survey	EU001 RTO Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM10 (Particulate Matter - 10 Microns Or Less)	0.04993200	0.0644	0.0147	0.0644	8760.0000	0.0644	8760.0000	100%	100%	24	0.3531	0.0147	539430.28	4071698.71	2.3	33.00	15000	60.17	122	0.00	09/16/2019	2019 Emissions Survey	EU06_EU09 RTO #4 Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM10 (Particulate Matter - 10 Microns Or Less)	0.04993200	0.0644	0.0147	0.0000	8760.0000	0.0000	8760.0000	0%	0%	24	0.0000	0.0000	539430.28	4071698.71	2.3	33.00	15000	60.17	122	0.00	01/01/2022	2019 Emissions Survey	EU06_EU09 RTO #4 Stack

~~RKW-1~~	~~0.0431~~	~~539430.28~~	~~4071698.71~~	~~1.5~~	~~40.00~~	~~4120.00~~	~~38.86~~	~~1500~~	~~0.0000~~	~~4/19/2014~~		~~EU001 RTO Stack~~
RKW-2	0.0274	539431.28	4071699.71	2.3	33.0	15000.0	60.2	122.0	0.0	>2016		EU06_EU09 RTO #4 Stack

Table 6-12. Offsite Source $PM_{2.5}$ PSD Increment Modeling Parameters

										Table 8-2 Col 1		Column 2 Information				Table 8-2 Col 2		Table 8-2 Col 3	PM10 NAAQS Modeled Emission Rates											
Facility ID	AI ID	Facility Name	County	Subject Item Designation	Distance from Site Center (km)	Distance from Facility to Site Center < 50 km	Pollutant	Estimated Emissions (ton/year)	PTE Emissions (tons/yr)	PTE Emissions (lbs/hr)	2023 Actual Emissions (tons/yr)	2023 Hours of Operation	2024 Actual Emissions (tons/yr)	2024 Hours of Operation	2023 Operating Level	2024 Operating Level	24-Hour Operating Factor (hr/day)	24 hour Emission Rate (lb/day)	24 hour Emission Rate (lb/hr)	Easting	Northing	Stack Diameter (ft)	Stack Height (ft)	Stack Flow Rate (cfm)	Stack Velocity (ft/sec)	Temp (F)	Plume Height (ft)	Construction Date	Emissions Document	Comments (see 2024 air permit)
2121300059	107116	RKW North America Inc	Simpson	RKW-1	0.823	Y	PM2.5 (Particulate Matter - 2.5 Microns Or Less)	0.04993200	0.0125	0.0029	0.0122	8760.0000	0.0122	8760.0000	98%	98%	24	0.0670	0.0028	539430.28	4071698.71	1.5	40.00	4120	38.86	1500	0.00	04/19/2014	2019 Emissions Survey	EU001 RTO Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-1	0.823	Y	PM2.5 (Particulate Matter - 2.5 Microns Or Less)	0.04993200	0.0175	0.0040	0.0175	8760.0000	0.0175	8760.0000	100%	100%	24	0.0957	0.0040	539430.28	4071698.71	0.0	0.00	0	0.00	77	40.00	04/19/2014	2019 Emissions Survey	EU001 RTO Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM2.5 (Particulate Matter - 2.5 Microns Or Less)	0.04993200	0.0139	0.0032	0.0139	8760.0000	0.0139	8760.0000	100%	100%	24	0.0760	0.0032	539430.28	4071698.71	2.3	33.00	15000	60.17	122	0.00	09/16/2019	2019 Emissions Survey	EU06_EU09 RTO #4 Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM2.5 (Particulate Matter - 2.5 Microns Or Less)	0.04993200	0.0139	0.0032	0.0000	8760.0000	0.0000	8760.0000	0%	0%	24	0.0000	0.0000	539430.28	4071698.71	2.3	33.00	15000	60.17	122	0.00	01/01/2022	2019 Emissions Survey	EU06_EU09 RTO #4 Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-1	0.823	Y	PM2.5 (Particulate Matter - 2.5 Microns Or Less)	0.04993200	0.0175	0.0040	0.0175	8760.0000	0.0175	8760.0000	100%	100%	24	0.0957	0.0040	539430.28	4071698.71	0.0	0.00	0	0.00	77	40.00	04/19/2014	2019 Emissions Survey	EU001 RTO Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM2.5 (Particulate Matter - 2.5 Microns Or Less)	0.04993200	0.0161	0.0037	0.0161	8760.0000	0.0161	8760.0000	100%	100%	24	0.0883	0.0037	539430.28	4071698.71	2.3	33.00	15000	60.17	122	0.00	09/16/2019	2019 Emissions Survey	EU06_EU09 RTO #4 Stack
2121300059	107116	RKW North America Inc	Simpson	RKW-2	0.823	Y	PM2.5 (Particulate Matter - 2.5 Microns Or Less)	0.04993200	0.0161	0.0037	0.0000	8760.0000	0.0000	8760.0000	0%	0%	24	0.0000	0.0000	539430.28	4071698.71	2.3	33.00	15000	60.17	122	0.00	01/01/2022	2019 Emissions Survey	EU06_EU09 RTO #4 Stack

~~RKW-1~~	~~0.0108~~	~~539430.28~~	~~4071698.71~~	~~1.5~~	~~40.00~~	~~4120.00~~	~~38.86~~	~~1500~~	~~0.0000~~	~~4/19/2014~~		~~EU001 RTO Stack~~
RKW-2	0.0068	539431.28	4071699.71	2.3	33.0	15000.0	60.2	122.0	0.0	>2016		EU06_EU09 RTO #4 Stack

Per Kevin Davis, 08/18/2025, assume 8,760 hours of operation for 2023.

Table 6-13. Results of PM_{10} and $PM_{2.5}$ Class II PSD Increment Analysis

Pollutant	Averaging Period	PSD Class II Increment ($\mu g/m^3$)	Modeled Resulting Concentration ($\mu g/m^3$)	% of PSD Class II Increment
PM_{10}	24-hour	30	8.19	27%
	Annual	17	1.95	11%
$PM_{2.5}$	24-hour	9	8.19	91%
	Annual	4	1.95	49%

Table 6-14. Class I Areas within 300 km of FWNA

Site/Class I Area	UTM Cooridnates		Shortest Distance to Fritz Winter (km)
	East (km)	North (km)	
Fritz Winter	539.82	4072.44	-
Mammoth Cave National Park	574.61	4109.48	51
Great Smoky Mountains National Park	774.92	3943.98	268
Joyce Kimer-Slickrock Wilderness	771.57	3928.7	273
Sipsey Wilderness	467.42	3798.71	283
Cohutta Wilderness	716.4	3874.22	265

Table 6-15. Results of PM_{10} and $PM_{2.5}$ Class I SIL Analysis

Pollutant	Averaging Period	PSD Class I SIL (μg/m^3)	Modeled Primary PM Concentration (μg/m^3)	Secondary PM2.5 (NO_X) (μg/m^3)	Secondary PM2.5 (SO_2) (μg/m^3)	Primary and Secondary PM2.5 Impact (μg/m3)	% of PSD Class I SIL
PM_{10}	24-hour	0.32	0.1550	N/A	N/A	N/A	48%
	Annual	0.16	0.0075	N/A	N/A	N/A	4.7%
$PM_{2.5}$	24-hour	0.27	0.1550	0.0007	0.0003	0.1560	58%
	Annual	0.03	0.0075	0.0001	0.00002	0.0076	25%

Table 6-16. Results of Toxics Modeling

		November 2024 RSLs		CU01	CU02	CU06	CU08	CU10	CU11	CU12	CU14	CU15	CU17	
Pollutant	**CAS #**	**Carcinogenic SL TR=1E-06 (ug/m³)**	**Noncarcinogenic SL THI=1 (ug or fibers/m³)**	**Melt Baghouse (CU01)** (lb/hr)	**Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)** (lb/hr)	**Sand Plant Baghouse (CU06)** (lb/hr)	**Core/Mold Baghouse (CU08)** (lb/hr)	**Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)** (lb/hr)	**Fettling Baghouse (CU11)** (lb/hr)	**Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)** (lb/hr)	**Paint Line #3 Booth Filter (CU14)** (lb/hr)	**Paint Line #2 Booth Filter (CU15)** (lb/hr)	**Paint Line #1 Booth Filter (CU17)** (lb/hr)	**Results** (µg/m³)
Arsenic (As)	7440-38-2	0.00065	0.016	1.53E-04	1.16E-06	6.09E-06	3.88E-06	5.37E-08	1.07E-05	2.99E-07	0.00E+00	0.00E+00	3.91E-06	2.00E-05
Beryllium (Be)	7440-41-7	0.0012	0.021	2.58E-07	8.16E-09	1.87E-06	8.48E-07	1.65E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Zero
Cadmium (Cd)	7440-43-9	0.0016	0.01	1.25E-04	7.91E-07	1.96E-07	8.79E-06	1.73E-09	4.76E-07	1.33E-08	0.00E+00	0.00E+00	1.74E-07	1.00E-05
Cobalt (Co)	7440-48-4	0.00031	0.0063	7.34E-05	5.57E-07	5.20E-06	3.07E-06	4.58E-08	1.44E-05	4.01E-07	0.00E+00	0.00E+00	5.25E-06	2.00E-05
Lead (Pb)	7439-92-1		0.15	1.02E-02	7.93E-05	3.24E-05	1.30E-05	2.85E-07	1.00E-05	2.81E-07	0.00E+00	0.00E+00	3.67E-06	1.13E-03
Manganese (Mn)	7439-96-5		0.052	6.74E-02	5.25E-04	2.66E-04	3.56E-04	2.35E-06	4.77E-03	1.33E-04	0.00E+00	0.00E+00	1.75E-03	9.49E-03
Mercury (Hg)	7439-97-6		0.31	5.58E-06	0.00E+00	0.00E+00	2.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Zero
Nickel (Ni)	7440-02-0	0.011	0.01	3.27E-04	2.19E-06	1.13E-05	2.37E-05	9.97E-08	2.07E-04	5.79E-06	0.00E+00	0.00E+00	7.57E-05	2.20E-04
Selenium (Se)	7782-49-2		21	5.34E-05	4.12E-07	2.87E-06	1.88E-07	2.53E-08	1.03E-05	2.87E-07	0.00E+00	0.00E+00	3.75E-06	1.00E-05
Acetaldehyde	75-07-0	1.3	9.4	0.00E+00	0.00E+00	1.37E-02	2.74E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.33E-03
Benzene	71-43-2	0.36	31	4.51E-05	0.00E+00	2.73E-01	5.46E-01	0.00E+00	0.00E+00	0.00E+00	8.22E-04	8.22E-04	0.00E+00	1.07E-01
Cumene	98-82-8		420	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.83E-03	9.83E-03	0.00E+00	5.63E-02
Ethyl Benzene	100-41-4	1.1	1000	0.00E+00	0.00E+00	1.55E-02	3.11E-02	0.00E+00	0.00E+00	0.00E+00	1.08E-01	1.08E-01	0.00E+00	6.22E-01
Formaldehyde	50-00-0	0.14	7.3	1.61E-03	0.00E+00	0.00E+00	3.18E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.20E-04
Hexane	110-54-3		730	3.87E-02	0.00E+00	0.00E+00	1.41E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.12E-03
Methanol	67-56-1		21000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.76E-02	1.31E-01
Naphthalene	91-20-3	0.083	3.1	1.31E-05	0.00E+00	1.37E-02	4.43E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E-03
3-Methylchloranthrene (POM)	56-49-5	0.00016		3.51E-08	0.00E+00	0.00E+00	1.41E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Zero
Benzo(b)fluoranthene (POM)	205-99-2	0.017		3.51E-08	0.00E+00	0.00E+00	1.41E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Zero
Benzo(k)fluoranthene (POM)	207-08-9	0.17		3.51E-08	0.00E+00	0.00E+00	1.41E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Zero
Dibenzo(a,h)anthracene (POM)	53-70-3	0.0017		2.34E-08	0.00E+00	0.00E+00	9.41E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Zero
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	0.017		3.51E-08	0.00E+00	0.00E+00	1.41E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Zero
1,2,4-Trimethylbenzene (TAC)	95-63-6		63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-01	1.49E-01	0.00E+00	8.53E-01
Solvent Naphtha (TAC)	64742-95-6		100	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-01	1.32E-01	0.00E+00	7.56E-01
Aluminum Powder (TAC)	7429-90-5		5.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.99E-02	8.41E-02

Table 7-1. VISCREEN Emission Rates

Pollutant	Potential Emissions (tpy)
PM	28.48
NO_x	13.24
Primary NO_2[1]	0
Soot[1]	0
Primary SO_4[1]	0

[1]VISCREEN default emission rates

Appendix B
Figures

Figure 2-1. Process Overview
Fritz Winter North America, LP – Franklin, KY

Process Flow Diagram

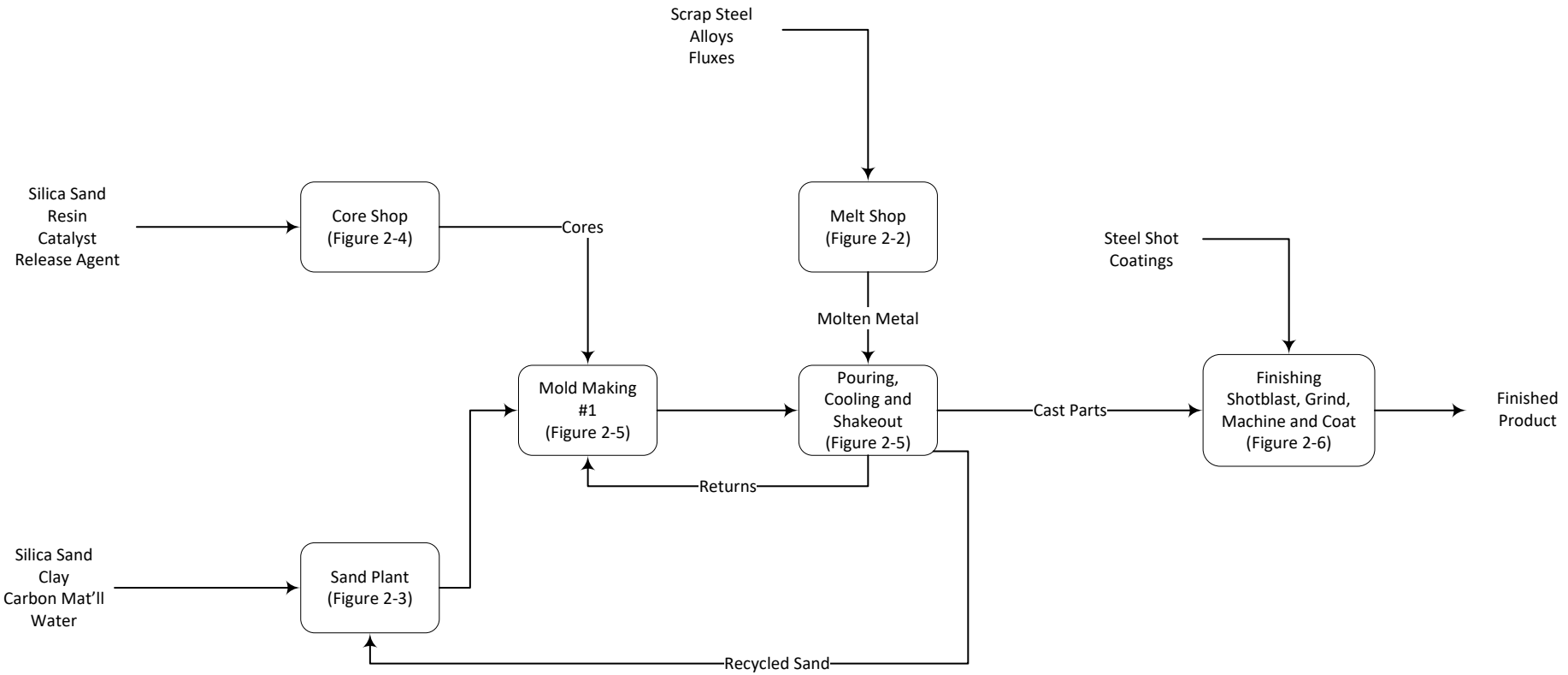
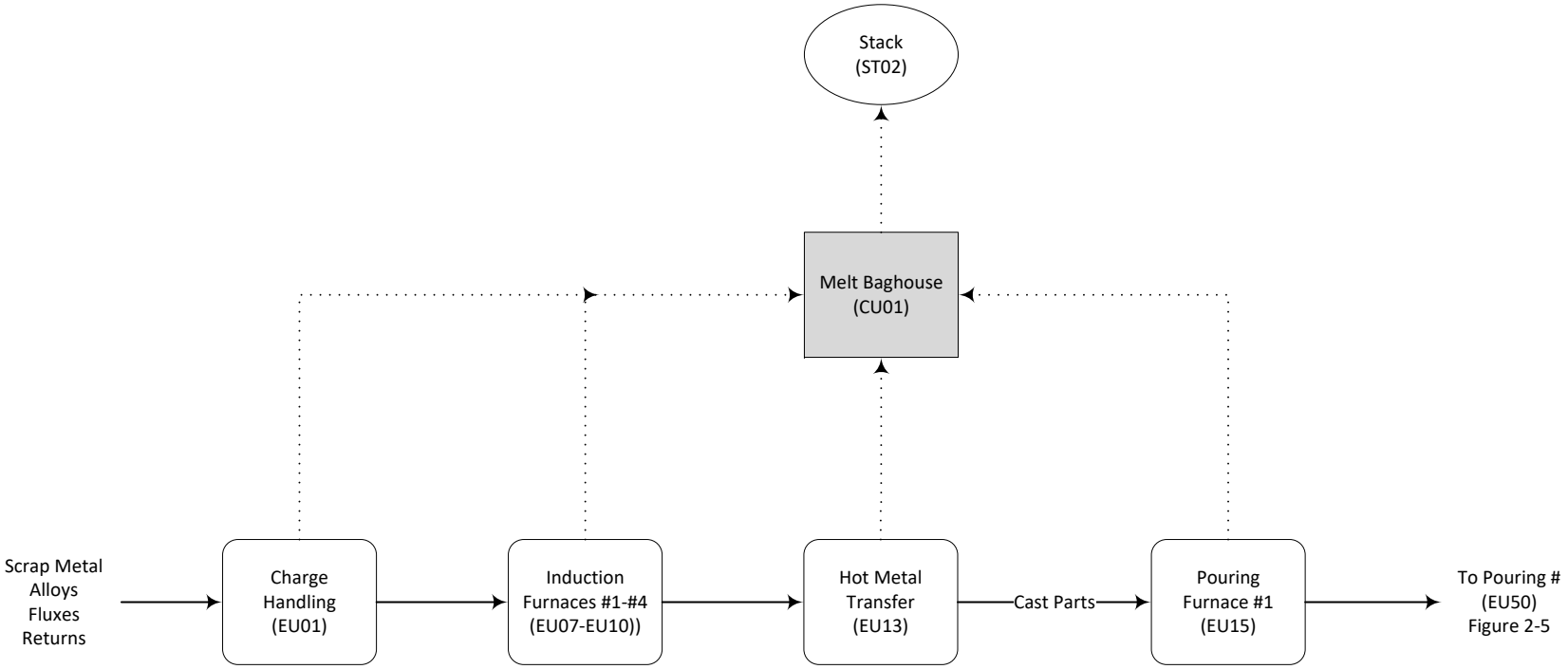


Figure 2-2. Melt Shop
Fritz Winter North America, LP – Franklin, KY

Process Flow Diagram



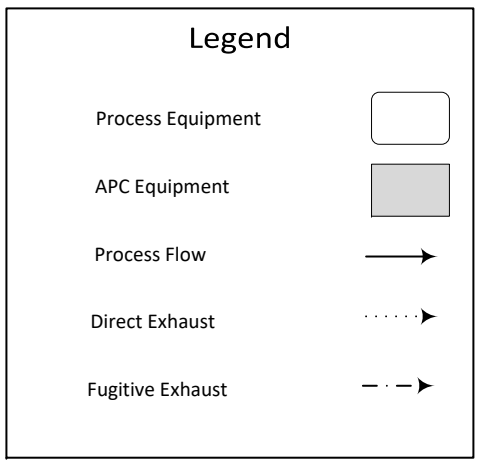


Figure 2-3. Sand Plant
Fritz Winter North America, LP – Franklin, KY

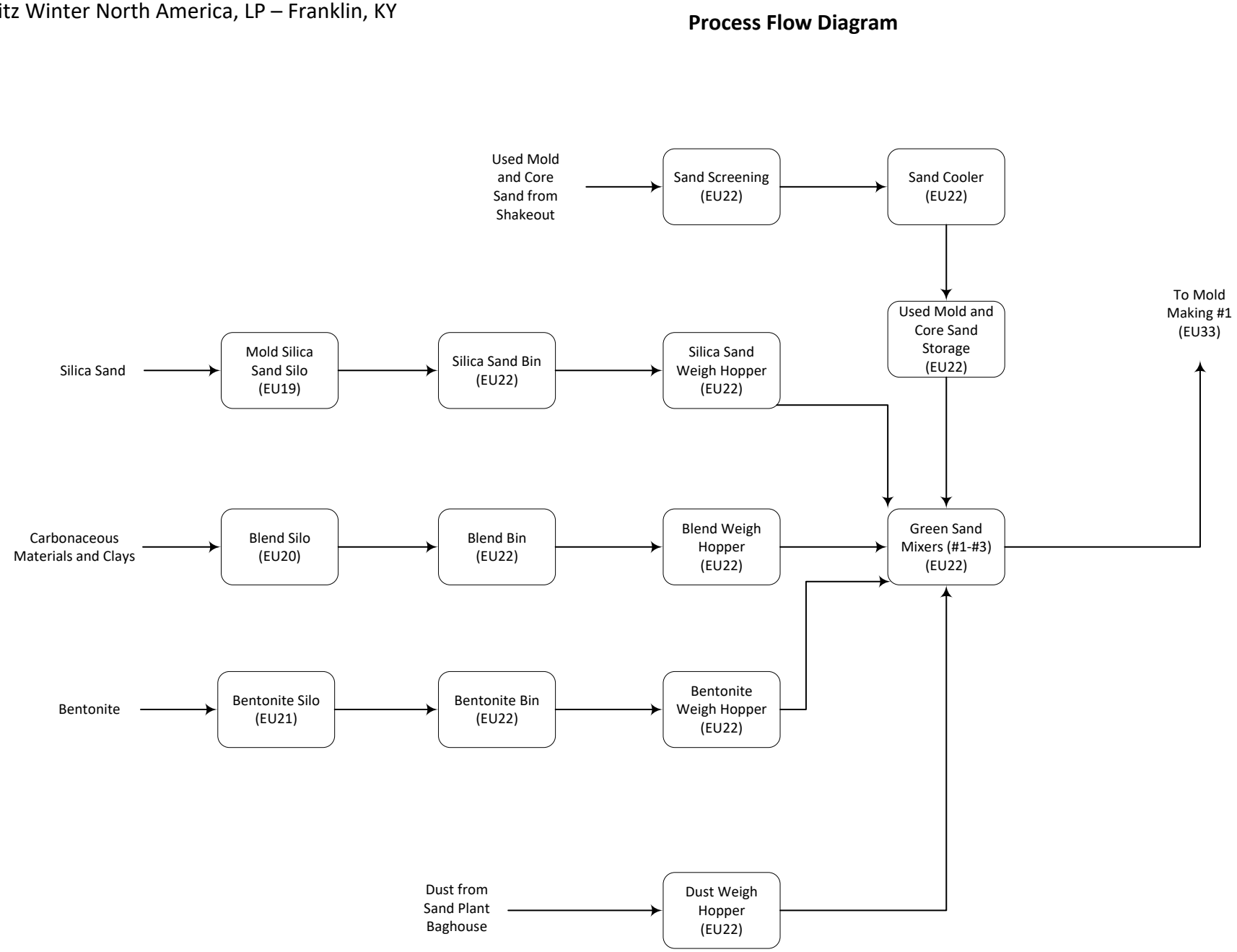


Figure 2-4. Core Shop
Fritz Winter North America, LP – Franklin, KY

Process Flow Diagram

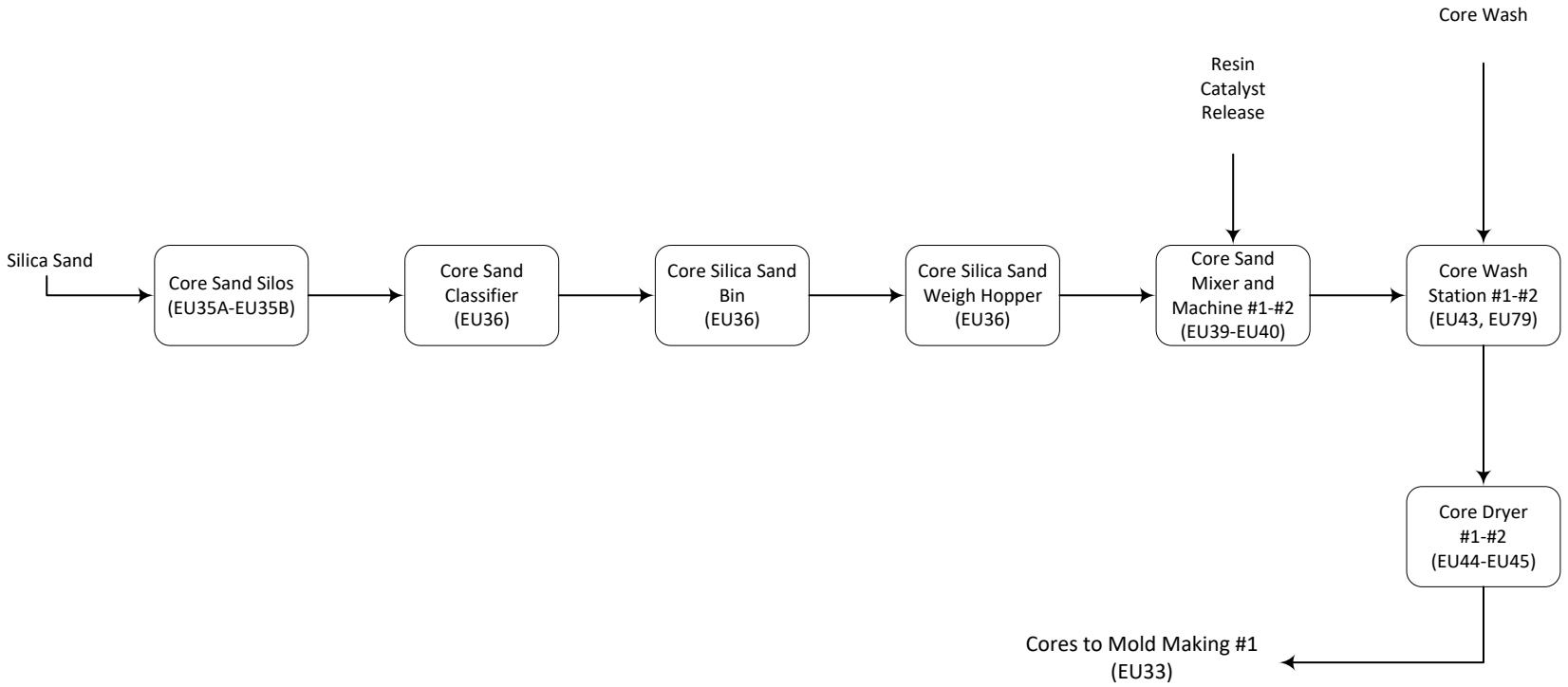


Figure 2-5. Pouring, Cooling and Shakeout
Fritz Winter North America, LP – Franklin, KY

Process Flow Diagram

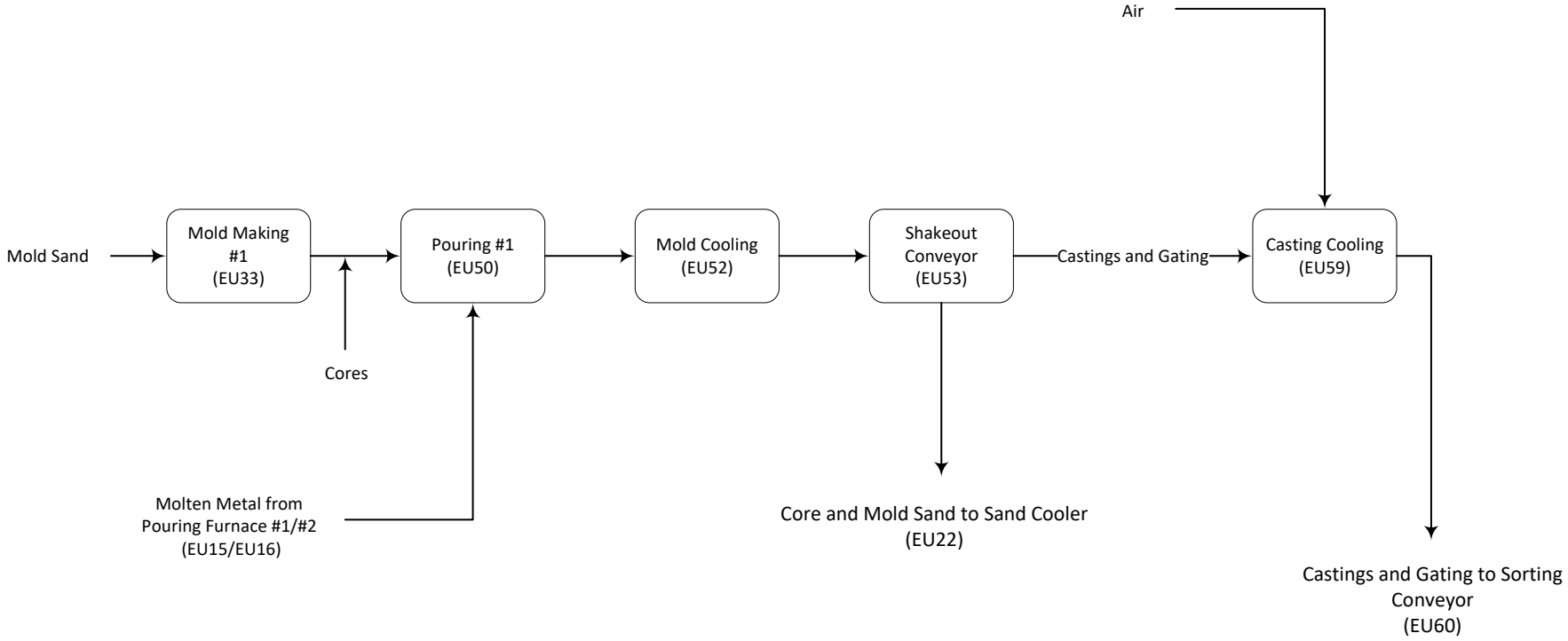


Figure 2-6. Finishing
Fritz Winter North America, LP – Franklin, KY

Process Flow Diagram

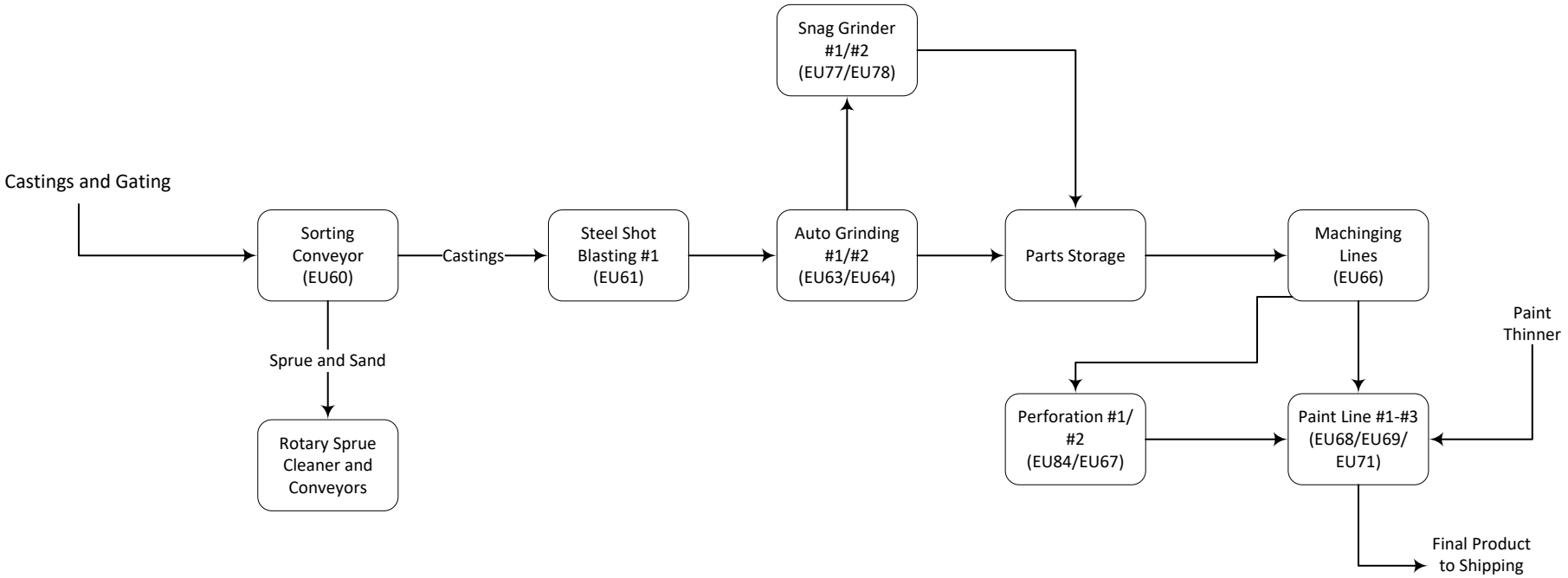


Figure 2-7. Plant Utilities
Fritz Winter North America, LP – Franklin, KY

Process Flow Diagram

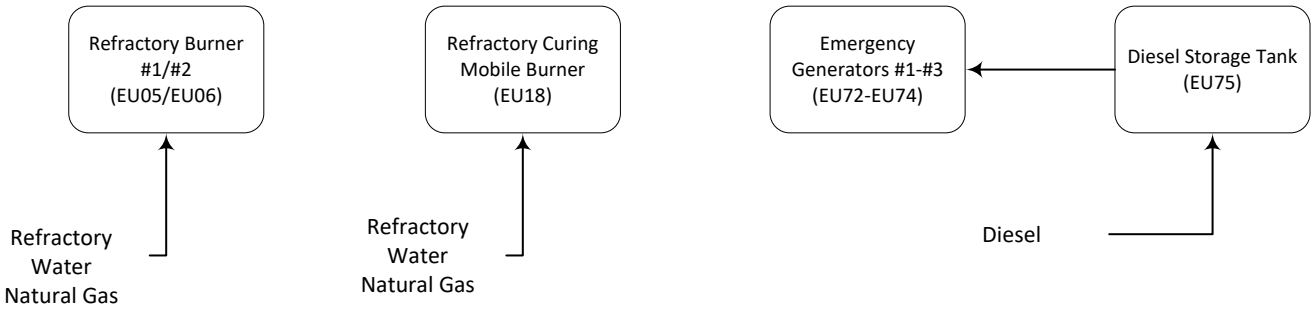


Figure 6-1. FWNA General Building, Emission Points and Property Outline

Figure 6-2. FWNA Location and Surrounding Area

Figure 6-3. SIL and SMC Receptor Locations

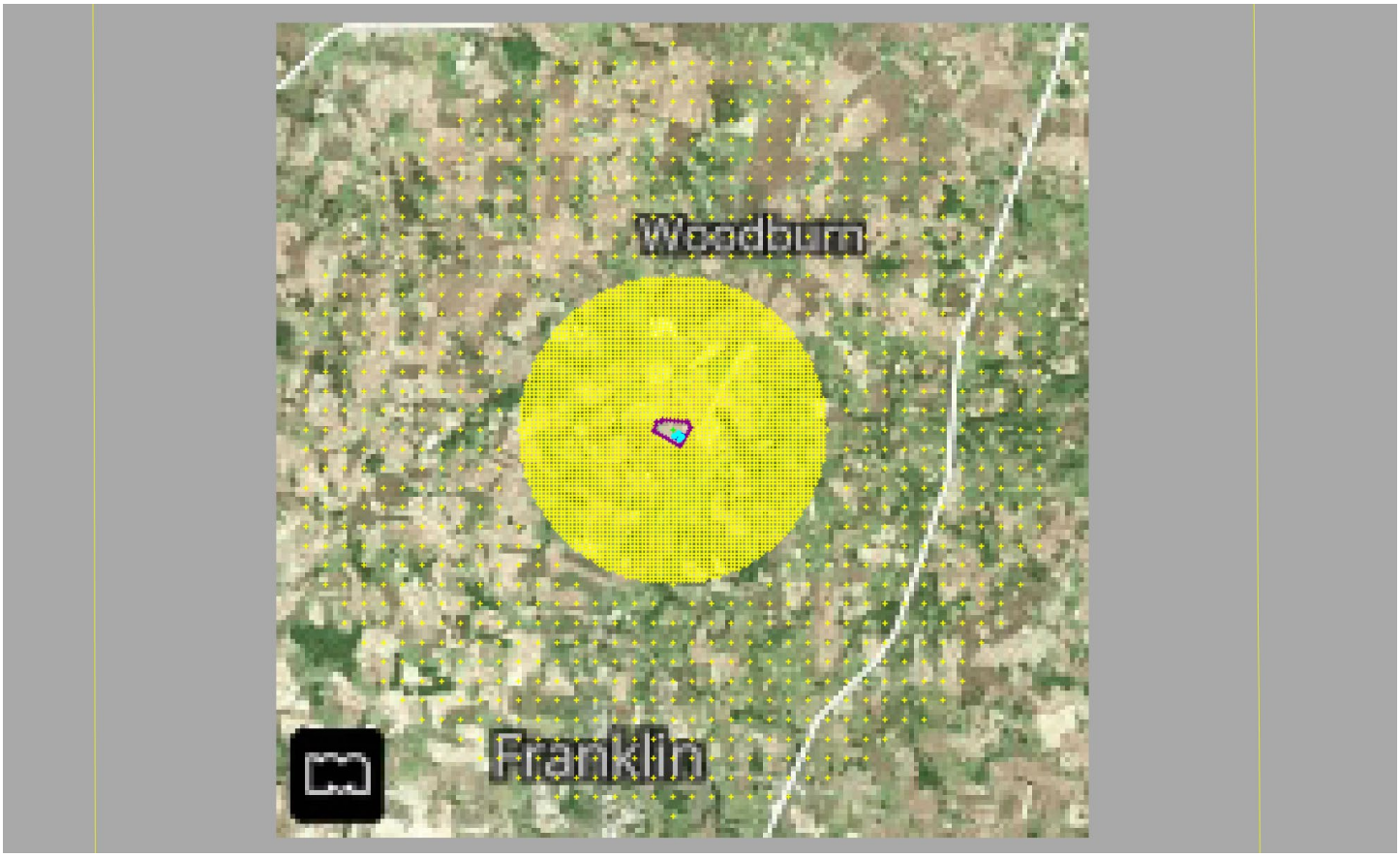


Figure 6-4. 24-hour PM_{10} SIL and SMC Model Output (SIL Radius 960 meters)

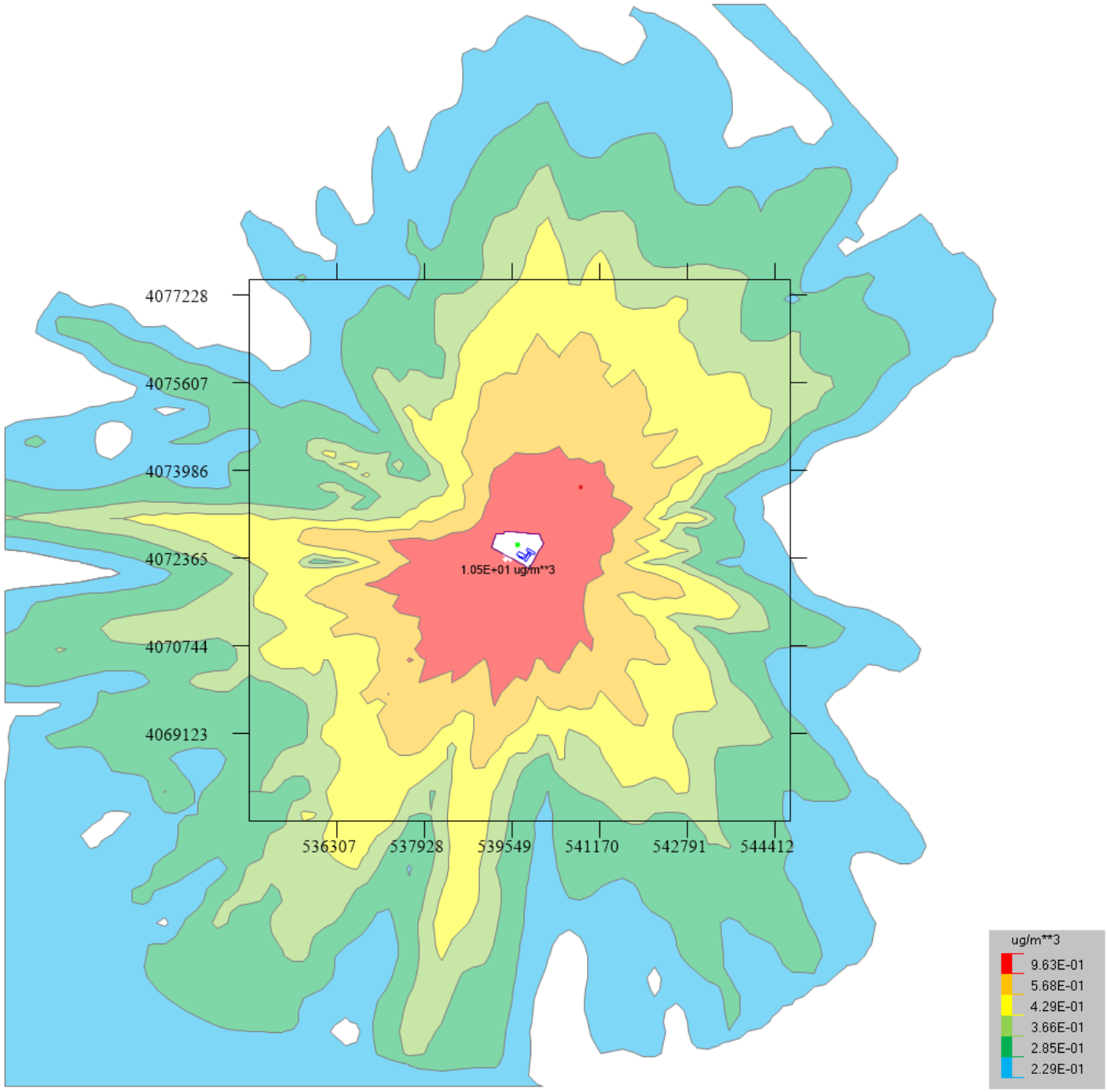


Figure 6-5. Annual PM_{10} SIL and SMC Model Output (SIL Radius 490 meters)

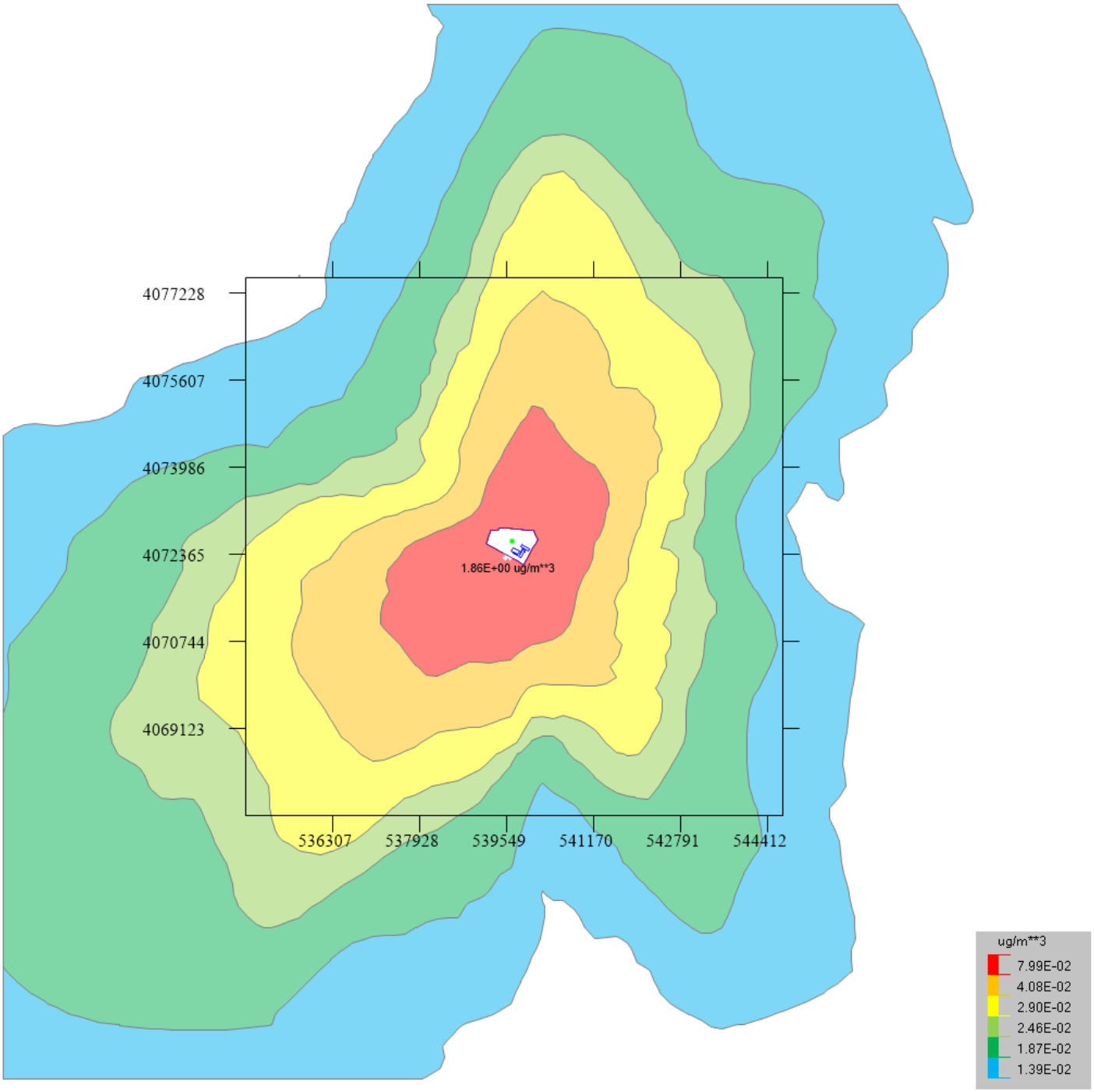


Figure 6-6. 24-hour $PM_{2.5}$ SIL and SMC Model Output (SIL Radius 2,680 meters)

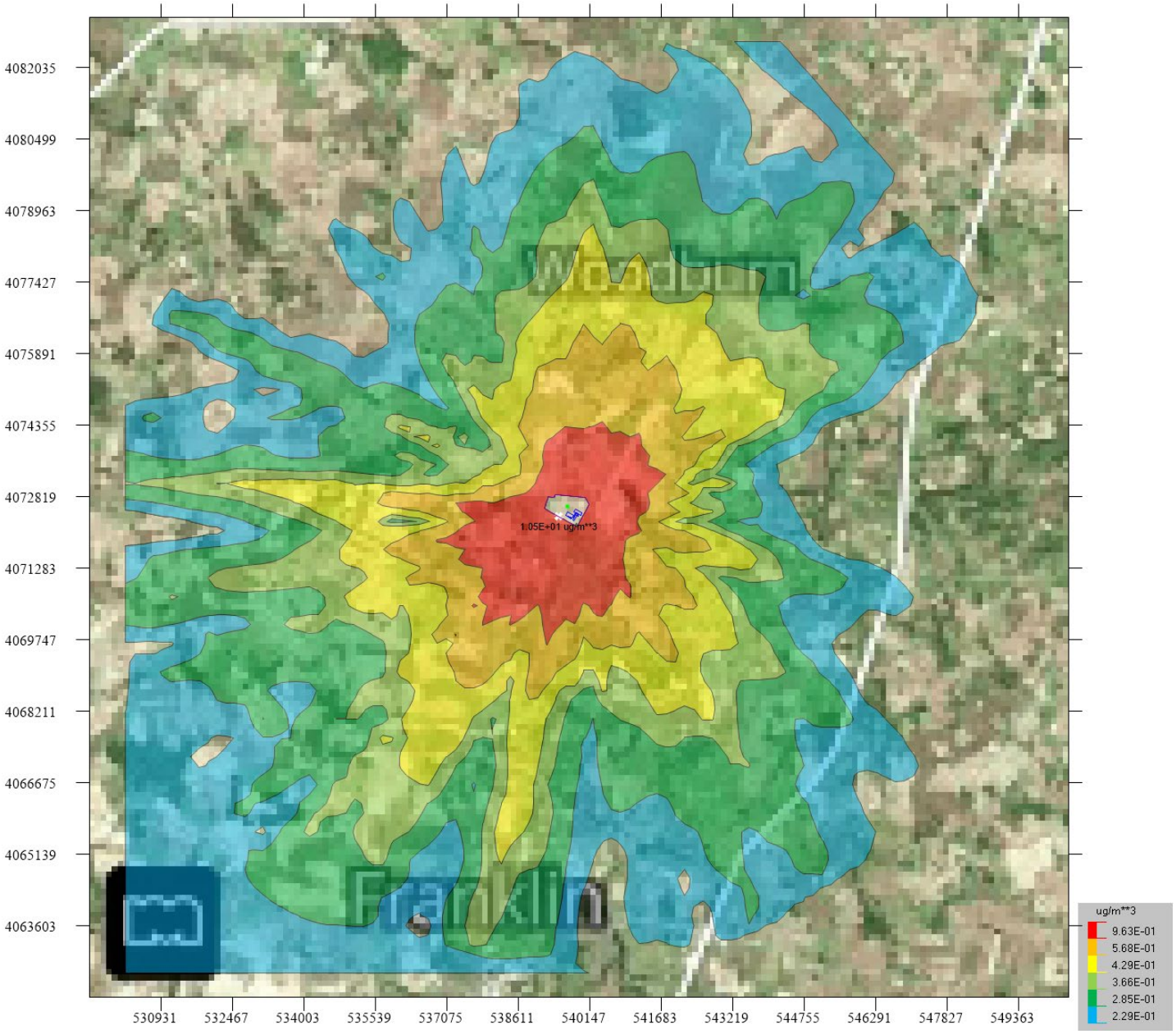


Figure 6-7. Annual $PM_{2.5}$ SIL and SMC Model Output (SIL Radius 2,110 meters)

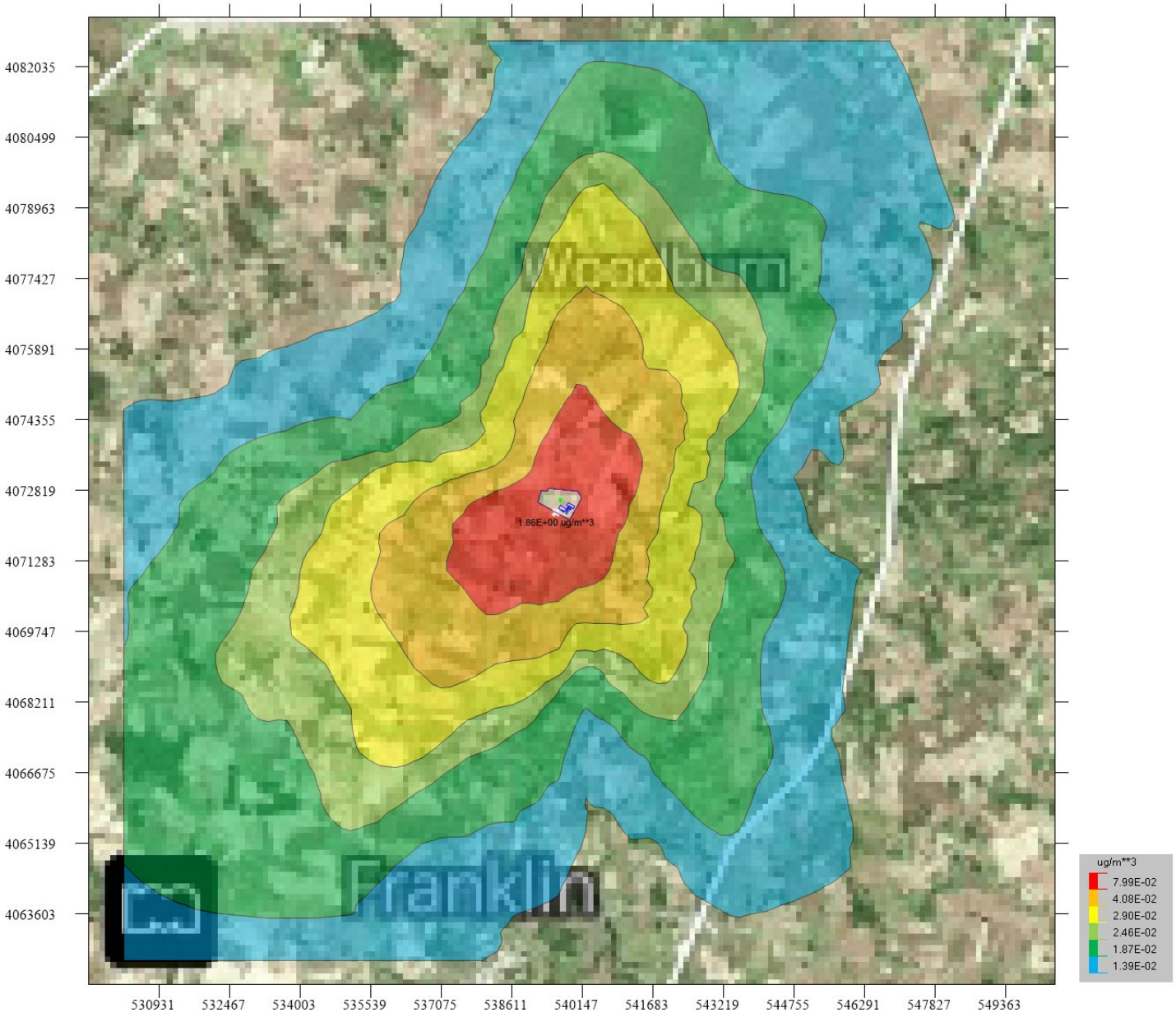


Figure 6-8. PM_{10} and $PM_{2.5}$ NAAQS and PSD Increment Receptor Locations

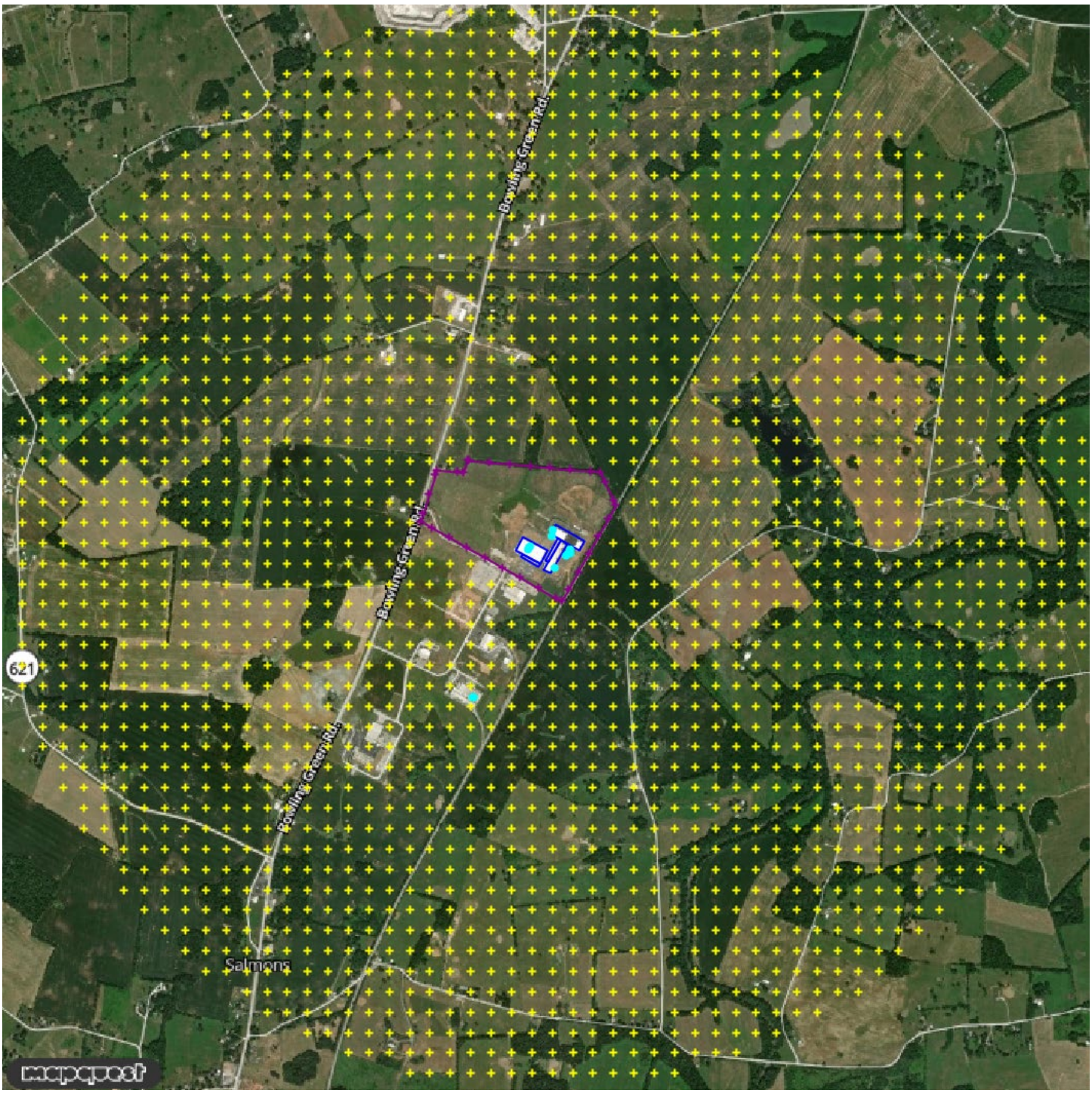


Figure 6-9. Class I Receptor Locations Relative to FWNA

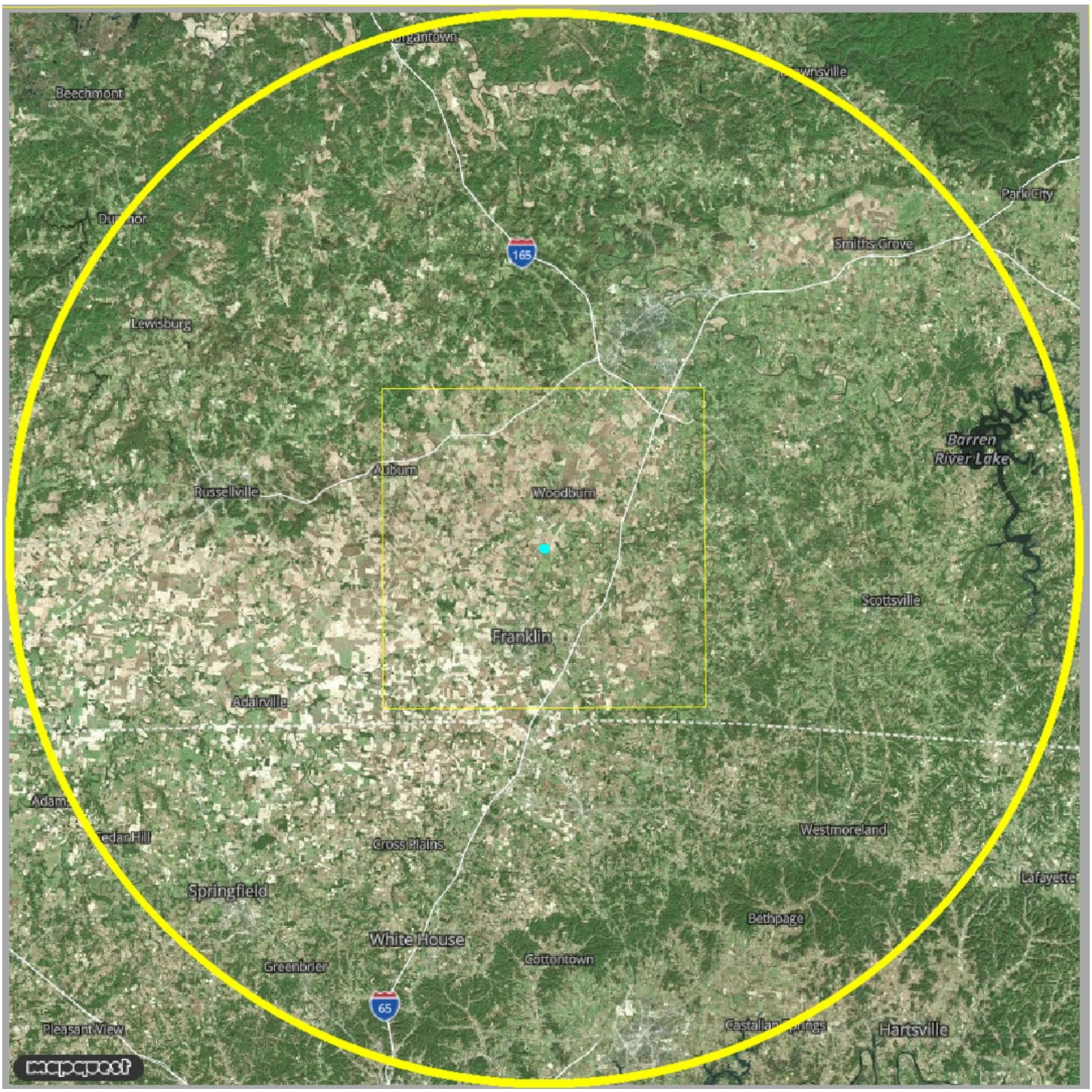
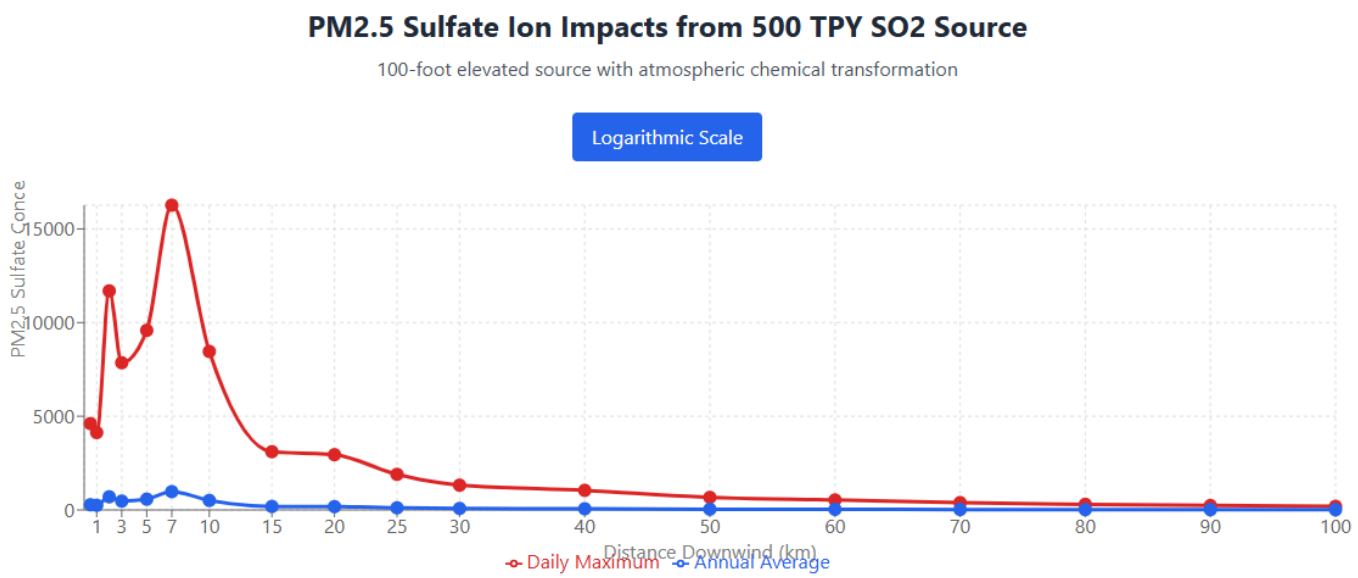


Figure 6-10. Secondary $PM_{2.5}$ Sulfate Ion Impacts from 500 TPY SO_2 Source



Key Assumptions:

- 500 TPY SO2 = 63.9 g/s emission rate
- 100-foot (30.5 m) elevated point source
- SO2 to SO_4^{2-} conversion increases with distance
- Molecular weight ratio SO4/SO2 = 1.5
- Maximum ground impacts at 3-10 km range

Regulatory Context:

- Class I PSD increment (annual): 0.03 µg/m³
- Class II PSD increment (annual): 0.13 µg/m³
- PM2.5 NAAQS (annual): 9.0 µg/m³
- PM2.5 NAAQS (24-hour): 35 µg/m³

Modeling Approach:

- Accounts for atmospheric dispersion using simplified Gaussian plume principles
- Incorporates SO2 to sulfate chemical transformation that increases with transport time/distance
- Uses molecular weight conversion factor (SO4/SO2 = 1.5)

Key Findings:

- Near-field impacts (0.5-5 km): Lower sulfate formation due to limited conversion time
- Mid-range impacts (10-30 km): Peak sulfate concentrations as conversion efficiency increases
- Far-field impacts (50+ km): Lower concentrations due to dispersion, despite high conversion efficiency

Figure 6-11. Air Toxic Receptor Locations

Appendix C
Historical Facility Performance Testing Results

Stack Testing History and Emission Factor Development
Fritz Winter North America, LP
Franklin, KY

APCD ID: CU01
STACK ID: ST02

	Compliance Test				Compliance Test				Compliance Test				Statistical Information						Statistical Information (excluding 12/2018 test)					
Date:	11/30/2018	12/3/2018	12/3/2018	Average	3/24/2020	3/24/2020	3/25/2020	Average	6/11/2024	6/12/2024	6/13/2024	Average	Average	St. Dev.	95% CI	99%CI	95% Upper	99% Upper	Average	St. Dev.	95% CI	99%CI	95% Upper	99% Upper
Test Run:	1	2	3		1	2	3		1	2	3													
Start Time:	7:35	5:06	9:31		7:00	11:40	7:00		7:05	7:35	6:40													
End Time:	11:44	9:10	13:34		11:08	15:47	11:04		13:59	14:05	12:55													
Run Time (min):	249	244	243	245	248	247	244	246	360	360	360	360												
Stack Temp. (F):	87.7	77.4	80.5	81.87	79.1	82.9	77.2	79.73	98.2	104.6	105.1	102.6												
Stack Pressure, in Hg (Ps)	29.28	29.28	29.28	29.28	29.62	29.62	29.62	29.62	29.35	29.37	29.34	29.35												
Moisture Fraction, dimensionless	0.02	0.01	0.01	0.01	0.010	0.012	0.010	0.011	0.010	0.013	0.017	0.013												
Stack Gas Vel. (AFPS):	52.20	50.7	51.1	51.33	49.1	48.9	46.5	48.17	32.4	29.7	29.9	30.7												
Stack Gas Flow (dscfm):	170,864	165,752	167,269	167,962	154,139	152,385	146,668	151,064	97,302	88,129	88,095	91,175												
Stack Gas Flow (acfm):	158,839	158,355	158,783	158,659	160,643	160,157	152,219	157,673	105,921	97,297	97,794	100,337												
Isokinetic Sampling Rate (%):	98.1	98.2	99.8	98.7	98.2	99.8	98.2	98.7	99.9	100.5	100.4	100												
EMISSION RESULTS																								
Filterable PM, mg - Catch weight:	5.6	10.8	7	7.80	9.9	2.9	3	5.26667	5.3	4.6	5.2	5.0												
Emission conc., gr/dscf	0.00045	0.00087	0.00056	0.00063	0.00079	0.00023	0.00025	0.00042	0.0004	0.0003	0.0003	0.0003	0.0005	0.0002	0.0002	0.0003	0.0006	0.0007	0.0004	0.0002	0.0002	0.0004	0.0006	0.0007
Emission rate, lbs./hr	0.62	1.2	0.76	0.86	1.1	0.3	0.32	0.57	0.34	0.2	0.23	0.26	0.5633	0.3803	0.2923	0.4253	0.8556	0.9886	0.4150	0.3399	0.3567	0.5595	0.7717	0.9745
Emission rate, lbs./ton	0.037	0.101	0.064	0.067	0.067	0.018	0.023	0.036	0.065	0.067	0.042	0.058	0.0539	0.0260	0.0200	0.0291	0.0739	0.0830	0.0472	0.0225	0.0237	0.0371	0.0708	0.0843
Condensable PM, mg - Catch weight:	19	14.9	4.5	12.80	2.4	4.2	2.5	3.0333	3.2	1.8	2.4	2.5												
Emission conc., gr/dscf	0.0015	0.0012	0.0004	0.0010	0.00019	0.00034	0.00021	0.0002	0.0003	0.0001	0.0001	0.0002	0.0005	0.0005	0.0004	0.0006	0.0009	0.0010	0.0002	0.0001	0.0001	0.0001	0.0003	0.0003
Emission rate, lbs./hr	2.1	1.65	0.50	1.417	0.25	0.44	0.27	0.320	0.20	0.078	0.10	0.13	0.6209	0.7330	0.5634	0.8198	1.1843	1.4407	0.2230	0.1317	0.1382	0.2168	0.3612	0.4398
Emission rate, lbs./ton	0.126	0.139	0.042	0.102	0.015	0.027	0.020	0.021	0.04	0.03	0.02	0.03	0.0501	0.0475	0.0365	0.0531	0.0866	0.1033	0.0241	0.0083	0.0087	0.0136	0.0328	0.0377
Total PM, mg - Catch weight:																								
Emission conc., gr/dscf	0.0020	0.0021	0.0010	0.0017	0.00099	0.00057	0.00046	0.0007	0.0007	0.0004	0.0004	0.0005	0.0009	0.0006	0.0005	0.0007	0.0014	0.0017	0.0006	0.0002	0.0002	0.0004	0.0008	0.0009
Emission rate, lbs./hr	2.72	2.85	1.26	2.28	1.3	0.74	0.58	0.87	0.54	0.28	0.33	0.38	1.1778	0.9796	0.7530	1.0956	1.9308	2.2734	0.6283	0.3699	0.3882	0.6089	1.0165	1.2372
Emission rate, lbs./ton	0.16	0.24	0.11	0.17	0.08	0.05	0.04	0.06	0.10	0.09	0.06	0.09	0.1037	0.0630	0.0484	0.0704	0.1521	0.1741	0.0708	0.0254	0.0267	0.0419	0.0975	0.1127
Methane Concentration, ppmvd	11.5	15.8	13.6	13.6	5.1	5.1	5.2	5.1																
CO, ppmvd	20.1	41.5	52.7	38.10	15.5	11.6	8.1	11.73	5.96	16.3	17.59	13.28	21.0389	15.6958	12.0649	17.5552	33.1038	38.5941	12.5083	4.7390	4.9732	7.8009	17.4816	20.3092
CO, lbs./hr	14	28.6	36.5	26.37	10.4	7.7	5.2	7.77	2.53	6.27	6.76	5.19	13.1067	11.6514	8.9561	13.0317	22.0628	26.1384	6.4767	2.6160	2.7454	4.3063	9.2220	10.7830
CO, lbs./ton	0.84	2.41	3.07	2.10	0.64	0.47	0.38	0.50	0.48	2.10	1.24	1.28	1.2919	0.9912	0.7619	1.1086	2.0538	2.4005	0.8857	0.6727	0.7059	1.1073	1.5916	1.9930
THC (as propane), ppmvd	4.6	4.6	3.5	4.23	2.4	3.5	3.3	3.07																
THC (as propane), ppmvw					2.4	3.4	3.2	3.00																
NMHC (as propane), ppmvd	0.8	0	0	0.27	0.7	1.8	1.5	1.33	0.13	1.13	2.62	1.29	0.9644	0.8949	0.6879	1.0009	1.6523	1.9654	1.3133	0.8705	0.9136	1.4330	2.2269	2.7463
NMHC (as propane), lbs./hr	0.85	0	0	0.28	0.75	1.9	1.6	1.42	0.087	0.68	1.59	0.79	0.8286	0.7310	0.5619	0.8176	1.3904	1.6461	1.1012	0.7007	0.7354	1.1535	1.8365	2.2547
NMHC (as propane), lbs./ton	0.051	0	0	0.02	0.046	0.116	0.117	0.093	0.02	0.23	0.29	0.179	0.0962	0.1036	0.0797	0.1159	0.1759	0.2121	0.1359	0.1057	0.1110	0.1740	0.2468	0.3099
PRODUCTION DATA																								
Melted (tph)	16.70	11.89	11.89	13.49	16.35	16.44	13.64	15.48	5.23	2.98	5.45	4.55												

Notes:
1) 2018 test production rate as determined by throughput rate of Pouring Furnace (EU15)
2) CO and VOC test duration was reduced
3) 2018 test was not witnessed by DAQ
4) 2018 test was conducted with emission units that were subsequently routed in 2019 to CU08/ST09

Stack Testing History and Emission Factor Development
Fritz Winter North America, LP
Franklin, KY

APCD ID: CU06
STACK ID: ST07

	Compliance Test				Compliance Test				Compliance Test				Statistical Information						Statistical Information (excluding 11/2018 for PM)					
Date:	11/27/2018	11/27/2018	11/27/2018	Average	3/25/2020	3/26/2020	3/26/2020	Average	6/11/2024	6/12/2024	6/13/2024	Average	Average	St. Dev.	95% CI	99%CI	95% Upper	99% Upper	Average	St. Dev.	95% CI	99%CI	95% Upper	99% Upper
Test Run:	1	2	3		1	2	3		1	2	3													
Start Time:	9:21	11:18	12:55		14:15	6:40	9:00		7:05	7:35	6:40													
End Time:	10:54	12:36	14:14		15:50	8:14	10:33		14:05	14:13	13:03													
Run Time (min):	90	75	75	80	90	90	90	90	360	360	360	360.00												
Stack Temp. (F):	77.2	79.1	77.2	77.83	94.5	92.5	95.6	94.20	89.1	96.4	96.5	94.00												
Stack Pressure, in. Hg (Ps)	29.38	29.38	29.38	29.38	29.24	29.06	29.06	29.12	29.32	29.32	29.28	29.31												
Moisture Fraction, dimensionless	0.026	0.023	0.020	0.023	0.030	0.029	0.031	0.030	0.027	0.030	0.038	0.032												
Stack Gas Vel. (AFPS):	48.00	48.5	47.1	47.9	50.2	49.1	50.6	49.97	46.9	50.8	49.4	49.0												
Stack Gas Flow (dscfm):	94,473	95,495	93,397	94,455	94,851	92,716	94,828	94,132	90,025	95,929	92,484	92812.67												
Stack Gas Flow (acfm):	100,527	101,637	98,711	100,292	105,085	102,856	106,052	104,664	98,211	106,340	103,500	102684												
Isokinetic Sampling Rate (%):	91.0	99.4	100.8	97.1	99.8	99.6	100.1	99.8	101.8	100.5	101.7	101.3												
EMISSION RESULTS																								
Filterable PM, mg - Catch weight:	1.8	1.6	1.7	1.70	4.7	4.5	3.4	4.20000	7.3	11.9	7.4	8.9												
Emission conc., gr/dscf	0.00042	0.0004	0.00043	0.00042	0.0010	0.0010	0.00074	0.00091	0.0005	0.0007	0.0005	0.0006	0.0006	0.0002	0.0002	0.0003	0.0008	0.0009	0.0007	0.0002	0.0002	0.0004	0.0010	0.0011
Emission rate, lbs./hr	0.34	0.33	0.34	0.34	0.84	0.8	0.6	0.75	0.3	0.49	0.3	0.36	0.4822	0.2159	0.1660	0.2415	0.6482	0.7237	0.5550	0.2356	0.2473	0.3878	0.8023	0.9428
Emission rate, lbs./ton	0.020	0.019	0.020	0.019	0.037	0.024	0.013	0.025	0.057	0.164	0.055	0.09	0.0455	0.0474	0.0365	0.0531	0.0819	0.0985	0.0585	0.0547	0.0574	0.0900	0.1159	0.1485
Condensable PM, mg - Catch weight:	45	50.4	49	48.13	3.9	3.5	5.2	4.2000	1.7	2.8	2.4	2.30												
Emission conc., gr/dscf	0.01	0.013	0.012	0.012	0.00085	0.00079	0.0011	0.00091	0.00009	0.00014	0.00012	0.00012	0.0042	0.0056	0.0043	0.0063	0.0086	0.0105	0.0005	0.0004	0.0005	0.0007	0.0010	0.0013
Emission rate, lbs./hr	8.4	10.4	9.9	9.6	0.69	0.62	0.92	0.743	0.069	0.12	0.098	0.096	3.4686	4.6123	3.5453	5.1587	7.0139	8.6273	0.4195	0.3687	0.3870	0.6070	0.8065	1.0265
Emission rate, lbs./ton	0.483	0.598	0.569	0.5	0.031	0.018	0.020	0.023	0.013	0.040	0.018	0.02	0.1989	0.2650	0.2037	0.2964	0.4026	0.4953	0.0235	0.0100	0.0105	0.0165	0.0340	0.0400
Total PM, mg - Catch weight:					8.6	8	8.6	8.400																
Emission conc., gr/dscf	0.010	0.013	0.012	0.012	0.0019	0.0018	0.0018	0.0018	0.0005	0.0007	0.0005	0.0006	0.0048	0.0055	0.0042	0.0062	0.0091	0.0110	0.0012	0.0007	0.0007	0.0011	**0.0019**	0.0023
Emission rate, lbs./hr	8.74	10.73	10.24	9.90	1.53	1.42	1.52	1.49	0.37	0.61	0.40	0.46	3.9511	4.5168	3.4719	5.0519	7.4230	9.0030	0.9750	0.5715	0.5997	0.9407	1.5747	1.9157
Emission rate, lbs./ton	0.50	0.62	0.59	0.57	0.07	0.04	0.03	0.05	0.071	0.205	0.073	0.12	0.2444	0.2502	0.1924	0.2799	0.4368	0.5243	0.0821	0.0622	0.0653	0.1025	0.1474	0.1845
Methane Concentration, ppmvd	0	0	0	0.0																				
CO, ppmvd	16.9	8.8	11.5	12.40					4.95	4.1	5.94	5.00	8.6983	4.8565	5.0966	7.9944	13.7950	16.6928						
CO, lbs./hr	7	3.7	4.7	5.13					1.95	1.72	2.40	2.02	3.5783	2.0236	2.1236	3.3310	5.7019	6.9094						
CO, lbs./ton	0.40	0.21	0.27	0.30					0.37	0.58	0.44	0.46	0.3792	0.1290	0.1353	0.2123	**0.5146**	0.5915						
THC (as propane), ppmvd	4.5	3.6	6.4	4.8																				
THC (as propane), ppmvw																								
NMHC (as propane), ppmvd	4.5	3.6	6.4	4.8					2.95	3.26	5.03	3.75	4.2900	1.2943	1.3583	2.1306	5.6483	6.4206						
NMHC (as propane), lbs./hr	2.9	2.4	4.1	3.1					1.82	2.15	3.20	2.39	2.7617	0.8239	0.8646	1.3562	3.6263	4.1179						
NMHC (as propane), lbs./ton	0.17	0.14	0.24	0.2					0.35	0.72	0.59	0.552	0.3661	0.2385	0.2503	0.3926	**0.6164**	0.7587						
PRODUCTION DATA																								
Ton/hr Gray Iron (at Shakeout)	17.40	17.40	17.40	17.40	22.61	33.69	45.01	33.77	5.23	2.98	5.45	4.55												
Ton/hr Gray Iron Tapped					22.63	22.68	45.01	30.11																
					129.00	165.08	170.50	154.86																

Notes:
1) Row 47 2020 and 2024 production rate is base on tons of metal melted
2) Row 49 2020 is tons of sand processed

Stack Testing History and Emission Factor Development
Fritz Winter North America, LP
Franklin, KY

APCD ID: **CU07**
STACK ID: **ST08**

	Compliance Test				Compliance Test				Statistical Information					
Date:	11/29/2018	11/29/2018	11/29/2018	Average	6/14/2024	6/14/2024	6/14/2024	Average	Average	St. Dev.	95% CI	99%CI	95% Upper	99% Upper
Test Run:	1	2	3		1	2	3							
Start Time:	12:55	14:40	16:02		8:45	10:00	11:15							
End Time:	13:55	15:40	17:02		11:02	10:59	12:27							
Run Time (min):	60	60	60	60				#DIV/0!						
Stack Temp. (F):	71.2	71.5	68.8	70.50	88.3	88.8	90	89						
Barometric Pressure, in Hg (Ps)	29.4	29.4	29.4	29.40	29.39	29.39	29.38	29.39						
Moisture Fraction, dimensionless	0.005	0.003	0.003	0.004	0.026	0.026	0.025	0.026						
Stack Gas Vel. (AFPS):														
Stack Gas Flow (dscfm):	7,296	7,463	7,669	7,476	6,400	6,219	6,327	6,315						
Stack Gas Flow (acfm):	7,508	7,670	7,843	7,674										
Isokinetic Sampling Rate (%):														
EMISSION RESULTS														
Filterable PM, mg - Catch weight:														
Emission conc., gr/dscf														
Emission rate, lbs./hr														
Emission rate, lbs./ton														
Condensable PM, mg - Catch weight:														
Emission conc., gr/dscf														
Emission rate, lbs./hr														
Total PM, mg - Catch weight:														
Emission conc., gr/dscf														
Emission rate, lbs./hr														
Methane Concentration, ppmvd	0	0	0	0.0										
CO, ppmvd	14.4	14.3	0	9.57										
CO, lbs./hr	0.46	0.46	0	0.31										
CO, lbs./ton	3.68	3.68	0.00	2.45										
THC (VOC), ppmvd	8.3	7.7	18.0	11.33	52.9	47.1	57.0	52.33	31.8333	22.9688	24.1043	37.8093	55.9376	69.6427
THC (VOC), lbs./hr	0.42	0.39	0.95	0.59	2.33	2.01	2.48	2.27	1.4300	0.9572	1.0045	1.5756	2.4345	3.0056
THC (VOC), lbs./ton sand	3.36	3.12	7.59	4.69	17.13	16.89	18.10	17.38	11.0312	7.1409	7.4939	11.7547	18.5251	22.7859
THC (VOC), lbs./lb resin					0.74	0.73	0.78	0.75						
NMHC (as propane), ppmvd														
NMHC (as propane), lbs./hr														
NMHC (as propane), lbs./ton														
PRODUCTION DATA														
Amount of Cores (tph)	0.13	0.13	0.13	0.13	0.136	0.119	0.137	0.131						
					3.143	2.772	3.198	3.038						

Notes:
1) 2018 THC results are for NMHC; as there was no methane results are equivalent;

Stack Testing History and Emission Factor Development
Fritz Winter North America, LP
Franklin, KY

APCD ID: **CU08**
STACK ID: **ST09**

	Compliance Test				Compliance Test				Statistical Information					
Date:	**10/15/2019**	**10/16/2019**	**10/17/2019**	**Average**	**6/11/2024**	**6/12/2024**	**6/13/2024**	**Average**	**Average**	**St. Dev.**	**95% CI**	**99%CI**	**95% Upper**	**99% Upper**
Test Run:	1	2	3		1	2	3							
Start Time:	8:00	10:30	9:21		7:05	7:35	6:40							
End Time:	10:07	12:34	11:29		14:09	14:25	13:05							
Run Time (min):	120	120	120	120	360	360	360	360						
Stack Temp. (F):	90.3	88.3	79.6	86.1	91.2	107.3	111.7	103.4						
Stack Pressure, in Hg (Ps)	29.46	29.18	29.48	29.37	29.4	29.41	29.37	29.39						
Moisture Fraction, dimensionless:	0.010	0.015	0.014	0.013	0.012	0.016	0.019	0.016						
Stack Gas Vel. (AFPS):	55.80	59.1	58.3	57.7	55.3	53.7	54.4	54.5						
Stack Gas Flow (dscfm):	102,602	107,545	109,030	106,392	101,047	95,062	95,099	97,069						
Stack Gas Flow (acfm):	109,720	116,258	114,644	113,541	108,666	105,578	106,980	107,075						
Isokinetic Sampling Rate (%):	97.1	102.3	101.6	100.3	99.7	100.6	100.7	100.3						
EMISSION RESULTS														
Filterable PM, mg - Catch weight:	11.1	2.8	2.6	5.50	6.0	6.2	3.7	5.3	5.4000	3.1931	3.3510	5.2562	8.7510	10.6562
Filterable PM Concentration, gr/dscf	2.00E-03	4.70E-04	4.30E-04	9.67E-04	0.00029	0.00032	0.00019	0.00027	0.00062	0.0007	0.0007	0.0011	0.0013	0.0017
Filterable PM Emission Rate, lbs./hr	1.8	0.43	0.40	0.88	0.25	0.26	0.15	0.22	0.5483	0.6218	0.6526	1.0236	1.2009	1.5720
Filter PM Emission Factor, lbs./ton	0.126	0.031	0.029	0.062	0.048	0.087	0.028	0.054	0.0580	0.0402	0.0422	0.0662	0.1002	0.1242
Condensable PM, mg - Catch weight:	1.2	1.1	1.4	1.23	2.8	2.9	5.9	3.9	2.5500	1.8251	1.9153	3.0043	4.4653	5.5543
Condensable PM Concentration, gr/dscf	0.00022	0.00018	0.00023	0.00021	0.00014	0.00015	0.00030	0.00020	0.0002	0.0001	0.0001	0.0001	0.0003	0.0003
Condensable PM Emission Rate, lbs./hr	0.19	0.17	0.22	0.19	0.12	0.12	0.24	0.16	0.1767	0.0501	0.0525	0.0824	0.2292	0.2591
Condensable PM Emission Factor, lbs./ton	0.013	0.012	0.016	0.01	0.023	0.040	0.044	0.036	0.0248	0.0140	0.0147	0.0231	0.0395	0.0478
Total PM, mg - Catch weight:														
Total PM Concentration, gr/dscf	0.0022	0.0007	0.0007	0.0012	0.00043	0.00046	0.00049	0.00046	0.0008	0.0007	0.0007	0.0011	**0.0015**	0.0020
Total PM Emission Rate, lbs./hr	1.99	0.60	0.62	1.07	0.37	0.38	0.40	0.38	0.7267	0.6289	0.6600	1.0352	1.3866	1.7619
Total PM Emission Factor, lbs./ton	0.139	0.043	0.044	0.08	0.071	0.128	0.073	0.09	0.0831	0.0411	0.0431	0.0676	0.1262	0.1507
Methane Concentration, ppmvd														
CO, ppmvd	37.3	66.3	27.6	43.7	44	58.1	58.9	53.67	48.7000	14.8285	15.5615	24.4094	64.2615	73.1094
CO, lbs./hr	16.7	31.1	13.1	20.3	19.4	24.1	24.4	22.6	21.4667	6.4083	6.7251	10.5488	28.1918	32.0155
CO, lbs./ton	1.17	2.25	0.94	1.45	3.709	8.087	4.477	5.42	3.4385	2.6678	2.7997	4.3916	**6.2382**	7.8300
THC (as propane), ppmvd	9.5	9.6	5.4	8.2	18.3	19.4	25.1	20.93	14.5500	7.5182	7.8898	12.3758	22.4398	26.9258
THC (as propane), ppmvw	9.4	9.5	5.3	8.1	18.1	19.1	24.6	20.60	14.3333	7.3704	7.7348	12.1325	22.0681	26.4658
THC (as propane), lb/hr	6.70	7.10	4.00	5.9	12.7	12.7	16.4	13.9	9.9333	4.7077	4.9405	7.7495	14.8738	17.6828
THC (as propane), lb/ton	0.469	0.514	0.286	0.423	2.428	4.262	3.009	3.233	1.8280	1.6511	1.7327	2.7179	**3.5607**	4.5459
NMHC (as propane), ppmvd														
NMHC (as propane), lbs./hr														
NMHC (as propane), lbs./ton														
PRODUCTION DATA														
Tons Poured (tph)	14.3	13.8	14	14.03	5.23	2.98	5.45	4.55						
Core Sand (tph)	3.06	1.60	2.85	2.50										
Core Wash (tph)	0.06	0.05	0.07	0.06										

Stack Testing History and Emission Factor Development
Fritz Winter North America, LP
Franklin, KY

APCD ID: **CU11**
STACK ID: **ST12**

	Compliance Test				Compliance Test				Statistical Information					
Date:	**11/28/2018**	**11/28/2018**	**11/28/2018**	**Average**	**6/19/2024**	**6/20/2024**	**6/21/2024**	**Average**	**Average**	**St. Dev.**	**95% CI**	**99%CI**	**95% Upper**	**99% Upper**
Test Run:	1	2	3		1	2	3							
Start Time:	8:41	10:25	11:42		8:00	7:30	9:10							
End Time:	9:53	11:37	12:55		14:07	13:38	15:20							
Run Time (min):	60	70	70	66.7	360	360	360	360						
Stack Temp. (F):	50.8	56	58.6	55.1	97.5	104.2	95.5	99.07						
Stack Pressure, in Hg (Ps)	29.48	29.48	29.48	29.48	29.52	29.59	29.54	29.55						
Moisture Fraction, dimensionless	0.003	0.002	0.002	0.002	0.019	0.020	0.020	0.020						
Stack Gas Vel. (AFPS):	54.7	53.9	54.2	54.3	31.8	32.8	32.2	32.3						
Stack Gas Flow (dscfm):	65,456	63,874	63,946	64,425	34,358	35,091	34,869	34,773						
Stack Gas Flow (acfm):	64,453	63,450	63,891	63,931	37,462	38,697	37,907	38,022						
Isokinetic Sampling Rate (%):	102.0	97.9	97.7	99.2	102.3	100.0	101.1	101.1						
EMISSION RESULTS														
Filterable PM, mg - Catch weight:	2.3	2	2	2.10	3.6	4.8	6.8	5.1	3.5833	1.9229	2.0180	3.1654	5.6013	6.7487
Emission conc., gr/dscf	0.00058	0.00046	0.00046	0.00050	2.5E-04	3.4E-04	4.8E-04	3.6E-04	0.0004	0.0001	0.0001	0.0002	0.0006	0.0006
Emission rate, lbs./hr	0.32	0.25	0.25	0.27	0.075	0.10	0.14	0.11	0.1892	0.0979	0.1027	0.1612	0.2919	0.3503
Emission rate, lbs./ton	0.029	0.023	0.023	0.025	0.0012	0.0012	0.0065	0.003	0.0139	0.0124	0.0130	0.0204	0.0270	0.0344
Condensable PM, mg - Catch weight:														
Emission conc., gr/dscf														
Emission rate, lbs./hr														
Emission rate, lbs./ton														
Total PM, mg - Catch weight:														
Emission conc., gr/dscf														
Emission rate, lbs./hr														
Emission rate, lbs./ton														
PRODUCTION DATA														
Processed (tph)	10.96	10.96	10.96	10.96	60.62	85.98	21.70	56.10						

Stack Testing History and Emission Factor Development
Fritz Winter North America, LP
Franklin, KY

APCD ID: **CU14**
STACK ID: **ST15A**

	Compliance Test				Statistical Information					
Date:	6/18/2024	6/18/2024	6/18/2024	Average	Average	St. Dev.	95% CI	99%CI	95% Upper	99% Upper
Test Run:	1	2	3							
Start Time:	7:56	10:56	13:41							
End Time:	10:06	13:01	15:44							
Run Time (min):	120	120	120	120						
Stack Temp. (F):	102.8	102.6	104.6	103.33						
Stack Pressure, in Hg (Ps)	29.44	29.44	29.44	29.44						
Moisture Fraction, dimensionless	0.024	0.025	0.023	0.024						
Stack Gas Vel. (AFPS):	23.6	23.7	23	23.4						
Stack Gas Flow (dscfm):	1,778	1,784	1,735	1,766						
Stack Gas Flow (acfm):	1,974	1,982	1,931	1,962						
Isokinetic Sampling Rate (%):	99.8	100.4	100.0	100.1						
EMISSION RESULTS										
Filterable PM, mg - Catch weight:	4.2	5.1	6	5.1	5.1000	0.9000	2.2357	5.1571	7.3357	10.2571
Emission conc., gr/dscf	8.70E-04	0.001	0.0013	0.016	0.0011	0.0002	0.0005	0.0013	0.0016	0.0023
Emission rate, lbs./hr	0.013	0.016	0.019	0.016	0.0160	0.0030	0.0075	0.0172	0.0235	0.0332
Emission rate, lb./lb. coating	0.0014	0.0018	0.0021	0.0018	0.0018	0.0003	0.0008	0.0019	0.0026	0.0036
Condensable PM, mg - Catch weight:	3.9	5.3	4.9	4.7	4.7000	0.7211	1.7913	4.1320	6.4913	8.8320
Emission conc., gr/dscf	8.00E-04	0.0011	0.001	0.0010	0.0010	0.0002	0.0004	0.0009	0.0013	0.0018
Emission rate, lbs./hr	0.012	0.016	0.015	0.014	0.0143	0.0021	0.0052	0.0119	0.0195	0.0263
Emission rate, lb./lb. coating	0.0013	0.0018	0.0016	0.0016	0.0016	0.0002	0.0006	0.0013	0.0021	0.0029
Total PM, mg - Catch weight:	8.1	10.4	10.9	9.8000	9.8000	1.4933	3.7096	8.5569	13.5096	18.3569
Emission conc., gr/dscf	0.0017	0.0021	0.0023	0.0020	0.0020	0.0003	0.0008	0.0018	**0.0028**	0.0039
Emission rate, lbs./hr	0.025	0.032	0.034	0.030	0.0303	0.0047	0.0117	0.0271	0.0421	0.0574
Emission rate, lb./lb. coating	0.0028	0.0035	0.0038	0.0034	0.0034	0.0005	0.0013	0.0029	0.0046	0.0063
Methane Concentration, ppmvd										
THC (as propane), ppmvd	167.8	213.6	202.6	194.7	194.6667	23.9084	59.3918	136.9980	254.0585	331.6647
THC (as propane), lb/hr	2.05	2.62	2.42	2.36	2.3633	0.2892	0.7184	1.6571	3.0817	4.0204
THC (VOC), lb./lb. coating	0.23	0.29	0.27	0.26	0.2597	0.0318	0.0789	0.1821	0.3387	0.4418
NMHC (as propane), ppmvd										
NMHC (as propane), lbs./hr										
PRODUCTION DATA										
Coating Rate, lb/hr	9.10	9.10	9.10	9.10						

Stack Testing History and Emission Factor Development
Fritz Winter North America, LP
Franklin, KY

APCD ID: **CU15**
STACK ID: **ST15B**

	Compliance Test				Compliance Test				Statistical Information					
Date:	**12/5/2018**	**12/6/2018**	**12/6/2018**	**Average**	**6/18/2024**	**6/18/2024**	**6/18/2024**	**Average**	**Average**	**St. Dev.**	**95% CI**	**99%CI**	**95% Upper**	**99% Upper**
Test Run:	1	2	3		1	2	3							
Start Time:	14:53	7:36	12:18		7:55	10:55	13:40							
End Time:	19:11	11:44	16:24		10:05	13:00	15:47							
Run Time (min):	240	240	240	240	120	120	120	120						
Stack Temp. (F):	81.3	81.3	82	81.5	94.3	94	93.9	94.1						
Stack Pressure, in Hg (Ps)	29.59	29.69	29.609	29.63	29.47	29.48	29.48	29.48						
Moisture Fraction, dimensionless	0.006	0.005	0.005	0.005	0.018	0.020	0.022	0.020						
Stack Gas Vel. (AFPS):	32.1	31.7	31.9	31.9	42.5	43.8	42.6	43.0						
Stack Gas Flow (dscfm):	2,578	2,561	2,564	2,568	3,388	3,487	3,381	3,419						
Stack Gas Flow (acfm):	2,687	2,659	2,674	2,673	3,676	3,788	3,683	3,716						
Isokinetic Sampling Rate (%):	98.4	98.2	97.0	97.9	101.2	101.3	100.7	101.1						
EMISSION RESULTS														
Filterable PM, mg - Catch weight:	5.9	5.7	4.5	5.37	6.5	5.1	3.4	5.00	5.1833	1.1107	1.1656	1.8283	6.3489	7.0117
Emission conc., gr/dscf	0.00064	0.00062	0.0005	0.00059	0.0012	0.0010	0.0007	0.0010	0.0008	0.0003	0.0003	0.0004	0.0011	0.0012
Emission rate, lbs./hr	0.014	0.014	0.011	0.013	0.036	0.029	0.019	0.028	0.0205	0.0099	0.0104	0.0163	0.0309	0.0368
Emission rate, lb./lb. coating	0.0021	0.0024	0.0019	0.0021	0.0039	0.0032	0.0020	0.0030	0.0026	0.0008	0.0008	0.0013	0.0034	0.0039
Condensable PM, mg - Catch weight:					4.1	4.4	5.2	4.6	4.5667	0.5686	1.4125	3.2583	5.9792	7.8249
Emission conc., gr/dscf					0.0008	0.0009	0.0010	0.0009	0.0009	0.0001	0.0002	0.0006	0.0011	0.0015
Emission rate, lbs./hr					0.023	0.025	0.029	0.026	0.0257	0.0031	0.0076	0.0175	0.0333	0.0432
Emission rate, lb./lb. coating					0.0025	0.0027	0.0031	0.0028	0.0028	0.0003	0.0008	0.0018	0.0035	0.0045
Total PM, mg - Catch weight:					10.6	9.5	8.6	9.6	9.5667	1.0017	2.4883	5.7397	12.0549	15.3063
Emission conc., gr/dscf					0.002	0.0019	0.0017	0.0019	0.0019	0.0002	0.0004	0.0009	**0.0022**	0.0027
Emission rate, lbs./hr					0.059	0.055	0.048	0.054	0.0540	0.0056	0.0138	0.0319	0.0678	0.0859
Emission rate, lb./lb. coating					0.0063	0.0059	0.0052	0.0058	0.0058	0.0006	0.0014	0.0032	0.0072	0.0090
Methane Concentration, ppmvd	0	0	0	0.0										
THC (as propane), ppmvd	16.9	11	11.2	13.0	100.2	87.6	80.3	89.4	51.2000	42.3445	44.4379	69.7040	95.6379	120.9040
THC (as propane), lb/hr	0.30	0.19	0.20	0.23	2.33	2.1	1.86	2.097	1.1633	1.0339	1.0850	1.7019	2.2483	2.8652
THC (VOC), lb./lb. coating	0.045	0.034	0.035	0.04	0.25	0.23	0.20	0.23	0.1317	0.1040	0.1091	0.1712	**0.2408**	0.3029
NMHC (as propane), ppmvd	16.9	11	11.2	13.0										
NMHC (as propane), lbs./hr	0.30	0.19	0.20	0.23										
NMHC (as propane), lb/lb coating	0.045	0.034	0.035	0.04										
PRODUCTION DATA														
Coating Rate, lb/hr	6.67	5.59	5.71	5.99	9.30	9.30	9.30	9.30						

Stack Testing History and Emission Factor Development
Fritz Winter North America, LP
Franklin, KY

APCD ID: CU17
STACK ID: ST16

	Compliance Test				Compliance Test				Statistical Information						Statistical Information excluding 12/2018					
Date:	12/5/2018	12/6/2018	12/6/2018	Average	6/11/2024	6/12/2024	6/13/2024	Average	Average	St. Dev.	95% CI	99%CI	95% Upper	99% Upper	Average	St. Dev.	95% CI	99%CI	95% Upper	99% Upper
Test Run:	1	2	3		1	2	3													
Start Time:	14:53	7:36	12:18		8:30	11:45	9:00													
End Time:	19:11	11:44	16:24		10:47	14:05	12:24													
Run Time (min):	240	240	240	240	120	120	120	120												
Stack Temp. (F):	74.7	74.3	75.8	74.9	99.4	99.6	102.5	100.5												
Stack Pressure, in Hg (Ps)	29.61	29.71	29.71	29.68	29.56	29.56	29.64	29.59												
Moisture Fraction, dimensionless	0.003	0.002	0.003	0.003	0.028	0.021	0.026	0.025												
Stack Gas Vel. (AFPS):	29.20	30.3	30.8	30.1	36.60	35.9	36.3	36.3												
Stack Gas Flow (dscfm):	13,847	14,464	14,650	14,320	16,293	16,103	16,134	16,177												
Stack Gas Flow (acfm):	14,214	14,776	15,016	14,669	17,968	17,640	17,823	17,810												
Isokinetic Sampling Rate (%):	97.8	98.1	98.7	98.2	94.6	95.4	95.3	95.1												
EMISSION RESULTS																				
Filterable PM, mg - Catch weight:	2.9	4.4	4.8	4.03	5.4	5.1	4.3	4.9	4.4833	0.8796	0.9231	1.4479	5.4064	5.9312	4.9333	0.5686	1.4125	3.2583	5.8959	7.7416
Emission conc., gr/dscf	0.00023	0.00033	0.00035	0.00030	0.0017	0.0017	0.0014	0.0016	0.0010	0.0007	0.0008	0.0012	0.0017	0.0021	0.0016	0.0002	0.0004	0.0010	0.0014	0.0019
Emission rate, lbs./hr	0.027	0.041	0.044	0.037	0.24	0.23	0.19	0.22	0.1287	0.1016	0.1066	0.1672	0.2353	0.2959	0.2200	0.0265	0.0657	0.1516	0.1944	0.2803
Emission rate, lb./lb. coating	0.0026	0.0042	0.0045	0.0038	0.07	0.07	0.06	0.07	0.0357	0.0354	0.0371	0.0583	0.0729	0.0940	0.0677	0.0081	0.0202	0.0466	0.0560	0.0824
Condensable PM, mg - Catch weight:					5	4.6	6.3	5.3	5.3000	0.8888	2.2079	5.0930	7.5079	10.3930	5.3000	0.8888	2.2079	5.0930	7.5079	10.3930
Emission conc., gr/dscf					0.0016	0.0015	0.0020	0.0017	0.0017	0.0003	0.0007	0.0015	0.0024	0.0032	0.0017	0.0003	0.0007	0.0015	0.0024	0.0032
Emission rate, lbs./hr					0.22	0.21	0.28	0.24	0.2367	0.0379	0.0940	0.2169	0.3307	0.4536	0.2367	0.0379	0.0940	0.2169	0.3307	0.4536
Emission rate, lb./lb. coating					0.07	0.06	0.09	0.07	0.0728	0.0116	0.0289	0.0668	0.1018	0.1396	0.0728	0.0116	0.0289	0.0668	0.1018	0.1396
Total PM, mg - Catch weight:					10.4	9.7	10.6	10.2	10.2333	0.4726	1.1740	2.7079	11.4073	12.9413	10.2333	0.4726	1.1740	2.7079	11.4073	12.9413
Emission conc., gr/dscf					0.0033	0.0032	0.0034	0.0033	0.0033	0.0001	0.0002	0.0006	0.0035	0.0039	0.0033	0.0001	0.0002	0.0006	0.0035	0.0039
Emission rate, lbs./hr					0.46	0.44	0.47	0.46	0.4567	0.0153	0.0379	0.0875	0.4946	0.5442	0.4567	0.0153	0.0379	0.0875	0.4946	0.5442
Emission rate, lb./lb. coating					0.14	0.14	0.14	0.14	0.1405	0.0047	0.0117	0.0269	0.1522	0.1674	0.1405	0.0047	0.0117	0.0269	0.1522	0.1674
THC (VOC), ppmvd	15	9.7	16.5	13.7	4.7	5.13	4.52	4.78	9.2583	5.4014	5.6684	8.8914	14.9268	18.1497	4.7833	0.3134	13.4179	30.9508	22.6762	40.2091
THC (VOC), lb/hr	1.4	0.97	1.7	1.4	0.53	0.57	0.50	0.53	0.9450	0.5077	0.5327	0.8357	1.4777	1.7807	0.5333	0.0351	1.2611	2.9089	2.2061	3.8539
THC (VOC), lb./lb. coating	0.13	0.10	0.17	0.14	0.16	0.18	0.15	0.16	0.1501	0.0289	0.0304	0.0476	0.1804	0.1977	0.1641	0.0108	0.0719	0.1658	0.2220	0.3159
NMHC (as propane), ppmvd	15	9.7	16.5	13.73																
NMHC (as propane), lbs./hr	1.40	0.97	1.70	1.36																
PRODUCTION DATA																				
Coating Rate, lb/hr	10.38	9.76	9.78	9.97	3.25	3.25	3.25	3.25												

Appendix D
Potential to Emit Emission Calculations

TAC Summary (Hourly)

Toxic Air Contaminant Emissions Summary

		EU68	EU68	EU69	EU69	EU71	CU14	CU15	CU17	
Pollutant	**CAS #**	**Paint Line #3 (Coating)** (lb/hr)	**Paint Line #3 (Thinner)** (lb/hr)	**Paint Line #2 (Coating)** (lb/hr)	**Paint Line #2 (Thinner)** (lb/hr)	**Paint Line #1** (lb/hr)	**Paint Line #3 Booth Filter (CU14)** (lb/hr)	**Paint Line #2 Booth Filter (CU15)** (lb/hr)	**Paint Line #1 Booth Filter (CU17)** (lb/hr)	**TOTAL HAPs/TACs** (tpy)
1,2,4-Trimethylbenzene (TAC)	95-63-6	1.63E-01		1.63E-01						**3.26E-01**
Zinc (TAC)	7440-66-6						4.94E-02	4.94E-02	1.47E-01	**2.45E-01**
Zinc Oxide (TAC)	1314-13-2						1.53E-03	1.53E-03		**3.05E-03**
n-Butyl Acetate (TAC)	123-86-4		5.16E-01		5.16E-01					**1.03E+00**
Solvent Naphtha (TAC)	64742-95-6		1.44E-01		1.44E-01					**2.89E-01**
1-Butanol (TAC)	71-36-3		6.19E-02		6.19E-02					**1.24E-01**
Mesitylene (TAC)	108-67-6		3.30E-02		3.30E-02					**6.60E-02**
Aluminum Powder (TAC)	7429-90-5								4.99E-02	**4.99E-02**
Distillates, hydrotreated light (TAC)	64742-47-8					5.50E-02				**5.50E-02**
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9					5.50E-02				**5.50E-02**
Total TACs		**0.163**	**0.755**	**0.163**	**0.755**	**0.110**	**0.051**	**0.051**	**0.197**	**2.245**

TAC Summary (Annual)

Toxic Air Contaminant Emissions Summary

		EU68	EU68	EU69	EU69	EU71	CU14	CU15	CU17	
Pollutant	**CAS #**	**Paint Line #3 (Coating)** (tpy)	**Paint Line #3 (Thinner)** (tpy)	**Paint Line #2 (Coating)** (tpy)	**Paint Line #2 (Thinner)** (tpy)	**Paint Line #1** (tpy)	**Paint Line #3 Booth Filter (CU14)** (tpy)	**Paint Line #2 Booth Filter (CU15)** (tpy)	**Paint Line #1 Booth Filter (CU17)** (tpy)	**TOTAL HAPs/TACs** (tpy)
1,2,4-Trimethylbenzene (TAC)	95-63-6	6.52E-01		6.52E-01						**1.30E+00**
Zinc (TAC)	7440-66-6						2.16E-01	2.16E-01	6.43E-01	**1.08E+00**
Zinc Oxide (TAC)	1314-13-2						6.69E-03	6.69E-03		**1.34E-02**
n-Butyl Acetate (TAC)	123-86-4		2.06E+00		2.06E+00					**4.13E+00**
Solvent Naphtha (TAC)	64742-95-6		5.78E-01		5.78E-01					**1.16E+00**
1-Butanol (TAC)	71-36-3		2.48E-01		2.48E-01					**4.95E-01**
Mesitylene (TAC)	108-67-6		1.32E-01		1.32E-01					**2.64E-01**
Aluminum Powder (TAC)	7429-90-5								2.19E-01	**2.19E-01**
Distillates, hydrotreated light (TAC)	64742-47-8					1.00E-01				**1.00E-01**
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9					1.00E-01				**1.00E-01**
Total TACs		**0.652**	**3.021**	**0.652**	**3.021**	**0.200**	**0.223**	**0.223**	**0.862**	**8.852**

HAP Summary (Hourly)

Hazardous Air Pollutant Emissions Summary

Pollutant	CAS #	EU05 Refractory Burner #1 (lb/hr)	EU06 Refractory Burner #2 (lb/hr)	EU15 Pouring Furnace #1 (lb/hr)	EU18 Refractory Curing Mobile Burner (lb/hr)	EU39 PUCB Core Machine #1 (Resin) (lb/hr)	EU40 PUCB Core Machine #2 (Resin) (lb/hr)	EU44 Core Dryer #1 (lb/hr)	EU45 Core Dryer #2 (lb/hr)	HAPs Pouring Cooling Shakeout HAPs (Mold) (lb/hr)	HAPs Pouring Cooling Shakeout HAPs (Core) (lb/hr)	EU68 Paint Line #3 (Coating) (lb/hr)	EU68 Paint Line #3 (Thinner) (lb/hr)	EU69 Paint Line #2 (Coating) (lb/hr)	EU69 Paint Line #2 (Thinner) (lb/hr)	EU71 Paint Line #1 (lb/hr)	EU72 Emergency Generator #1 (lb/hr)	EU73 Emergency Generator #2 (lb/hr)	EU74 Emergency Generator #3 (lb/hr)	CU01 Melt Baghouse (CU01) (lb/hr)	CU02 Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02) (lb/hr)	CU06 Sand Plant Baghouse (CU06) (lb/hr)	CU08 Core/Mold Baghouse (CU08) (lb/hr)	CU10 Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10) (lb/hr)	CU11 Fettling Baghouse (CU11) (lb/hr)	CU12 Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12) (lb/hr)	CU13a-h Machining Cartridge Collectors (CU13a-h) (lb/hr)	CU13j Perforation Line #2 Cartridge Collector (CU13j) (lb/hr)	CU13i Perforation Line #1 Cartridge Collector (CU13i) (lb/hr)	TOTAL HAPs/TACs (lb/hr)
Antimony (Sb)	7440-36-0																												
Arsenic (As)	7440-38-2	1.67E-06	1.67E-06	5.71E-07	3.92E-07			7.84E-07	7.84E-07											1.49E-04	1.16E-06	6.09E-06	2.31E-06	5.37E-08	1.07E-05	2.99E-07	1.96E-06	9.78E-07	9.78E-07	**1.79E-04**
Beryllium (Be)	7440-41-7	1.00E-07	1.00E-07	3.42E-08	2.35E-08			4.71E-08	4.71E-08												8.16E-09	1.87E-06	7.54E-07	1.65E-08							**3.00E-06**
Cadmium (Cd)	7440-43-9	9.17E-06	9.17E-06	3.14E-06	2.16E-06			4.31E-06	4.31E-06											1.02E-04	7.91E-07	1.96E-07	1.58E-07	1.73E-09	4.76E-07	1.33E-08	8.70E-08	4.35E-08	4.35E-08	**1.36E-04**
Chromium (Cr)	7440-47-3	1.17E-05	1.17E-05	3.99E-06	2.75E-06			5.49E-06	5.49E-06											9.73E-04	7.58E-06	1.69E-05	1.65E-05	1.49E-07	7.51E-04	2.10E-05	1.37E-04	6.86E-05	6.86E-05	**2.10E-03**
Cobalt (Co)	7440-48-4	7.00E-07	7.00E-07	2.40E-07	1.65E-07			3.29E-07	3.29E-07											7.16E-05	5.57E-07	5.20E-06	2.41E-06	4.58E-08	1.44E-05	4.01E-07	2.62E-06	1.31E-06	1.31E-06	**1.02E-04**
Lead (Pb)	7439-92-1																			1.02E-02	7.93E-05	3.24E-05	1.30E-05	2.85E-07	1.00E-05	2.81E-07	1.84E-06	9.18E-07	9.18E-07	**1.03E-02**
Manganese (Mn)	7439-96-5	3.17E-06	3.17E-06	1.08E-06	7.45E-07			1.49E-06	1.49E-06											6.74E-02	5.25E-04	2.66E-04	3.53E-04	2.35E-06	4.77E-03	1.33E-04	8.73E-04	4.36E-04	4.36E-04	**7.52E-02**
Mercury (Hg)	7439-97-6	2.17E-06	2.17E-06	7.42E-07	5.10E-07			1.02E-06	1.02E-06																						**7.62E-06**
Nickel (Ni)	7440-02-0	1.75E-05	1.75E-05	5.99E-06	4.12E-06			8.24E-06	8.24E-06											2.81E-04	2.19E-06	1.13E-05	7.18E-06	9.97E-08	2.07E-04	5.79E-06	3.78E-05	1.89E-05	1.89E-05	**6.52E-04**
Selenium (Se)	7782-49-2	2.00E-07	2.00E-07	6.85E-08	4.71E-08			9.41E-08	9.41E-08											5.29E-05	4.12E-07	2.87E-06		2.53E-08	1.03E-05	2.87E-07	1.88E-06	9.38E-07	9.38E-07	**7.12E-05**
1,2,4 Trimethylbenzene	95-63-6																														
1,3-Butadiene	106-99-0																		1.53E-05											**1.53E-05**
Acenaphthene (POM)	83-32-9	1.50E-08	1.50E-08	5.14E-09	3.53E-09			7.06E-09	7.06E-09								3.44E-05	3.44E-05	5.57E-07											**6.94E-05**
Acenaphthylene (POM)	208-96-8	1.50E-08	1.50E-08	5.14E-09	3.53E-09			7.06E-09	7.06E-09								6.78E-05	6.78E-05	1.98E-06											**1.38E-04**
Acetaldehyde	75-07-0									6.74E-02							1.85E-04	1.85E-04	3.01E-04											**6.81E-02**
Acetophenone	98-86-2																														
Acrolein	107-02-8																5.79E-05	5.79E-05	3.63E-05											**1.52E-04**
Aniline	62-53-3																														
Anthracene (POM)	120-12-7	2.00E-08	2.00E-08	6.85E-09	4.71E-09			9.41E-09	9.41E-09								9.04E-06	9.04E-06	7.33E-07											**1.89E-05**
Benzene	71-43-2	1.75E-05	1.75E-05	5.99E-06	4.12E-06			8.24E-06	8.24E-06	1.09E+00	3.77E-01	9.00E-04		9.00E-04			5.70E-03	5.70E-03	3.66E-04											**1.48E+00**
Cresol	1319-77-3																														
Cumene	98-82-8											5.40E-03	5.37E-03	5.40E-03	5.37E-03															**2.15E-02**
Dibenzofurans	132-64-9																														
Dichlorobenzene	25321-22-6	1.00E-05	1.00E-05	3.42E-06	2.35E-06			4.71E-06	4.71E-06																					**3.52E-05**
Ethyl Benzene	100-41-4									7.47E-02	2.68E-03	8.55E-02	3.30E-02	8.55E-02	3.30E-02															**3.14E-01**
Formaldehyde	50-00-0	6.25E-04	6.25E-04	2.14E-04	1.47E-04	3.15E-03	3.15E-03	2.94E-04	2.94E-04								5.80E-04	5.80E-04	4.63E-04											**1.01E-02**
Hexane	110-54-3	1.50E-02	1.50E-02	5.14E-03	3.53E-03			7.06E-03	7.06E-03																					**5.28E-02**
Hydrogen Flouride	7664-39-3																														
Methanol	67-56-1															1.87E-01														**1.87E-01**
Methyl Chloride	74-87-3																														
Methylene diphenyl diisocyanate (MDI)	101-68-8																														
m-Xylene	108-38-3																														
Naphthalene	91-20-3	5.08E-06	5.08E-06	1.74E-06	1.20E-06	2.04E-02	2.04E-02	2.39E-06	2.39E-06		1.00E-01						9.56E-04	9.56E-04	3.32E-05											**1.43E-01**
Nitrobenzene	98-95-3																														
o-Cresol	95-48-7																														
o-Xylene	95-47-6																														
Phenol	108-95-2					1.28E-02	1.28E-02				8.43E-01																			**8.68E-01**
Propionaldehyde	123-38-6																														
P-Xylene	106-42-3																														
Styrene	100-42-5																														
Toluene	108-88-3	2.83E-05	2.83E-05	9.70E-06	6.67E-06			1.33E-05	1.33E-05	6.16E-01	5.27E-02	1.80E-03		1.80E-03			2.07E-03	2.07E-03	1.60E-04											**6.77E-01**
Xylenes	1330-20-7									4.55E-01	1.52E-02	3.50E-01	6.19E-02	3.50E-01	6.19E-02		1.42E-03	1.42E-03	1.12E-04											**1.30E+00**
2-Methylnaphthalene (POM)	91-57-6	2.00E-07	2.00E-07	6.85E-08				9.41E-08	9.41E-08																					**6.57E-07**
3-Methylchloranthrene (POM)	56-49-5	1.50E-08	1.50E-08	5.14E-09				7.06E-09	7.06E-09																					**4.93E-08**
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.33E-07	1.33E-07	4.56E-08				6.27E-08	6.27E-08																					**4.38E-07**
Benz(a)anthracene (POM)	56-55-3	1.50E-08	1.50E-08	5.14E-09				7.06E-09	7.06E-09								4.57E-06	4.57E-06	6.59E-07											**9.85E-06**
Benzo(a)pyrene (POM)	50-32-8	1.00E-08	1.00E-08	3.42E-09				4.71E-09	4.71E-09								1.89E-06	1.89E-06	7.37E-08											**3.88E-06**
Benzo(b)fluoranthene (POM)	205-99-2	1.50E-08	1.50E-08	5.14E-09				7.06E-09	7.06E-09								8.16E-06	8.16E-06	3.88E-08											**1.64E-05**
Benzo(g,h,i)perylene (POM)	191-24-2	1.00E-08	1.00E-08	3.42E-09				4.71E-09	4.71E-09								4.09E-06	4.09E-06	1.92E-07											**8.40E-06**
Benzo(k)fluoranthene (POM)	207-08-9	1.50E-08	1.50E-08	5.14E-09				7.06E-09	7.06E-09								1.60E-06	1.60E-06	6.08E-08											**3.31E-06**
Chrysene (POM)	218-01-9	1.50E-08	1.50E-08	5.14E-09				7.06E-09	7.06E-09								1.12E-05	1.12E-05	1.38E-07											**2.27E-05**
Dibenzo(a,h)anthracene (POM)	53-70-3	1.00E-08	1.00E-08	3.42E-09				4.71E-09	4.71E-09								2.54E-06	2.54E-06	2.29E-07											**5.35E-06**
Fluoranthene (POM)	206-44-0	2.50E-08	2.50E-08	8.56E-09				1.18E-08	1.18E-08								2.96E-05	2.96E-05	2.98E-06											**6.23E-05**
Fluorene (POM)	86-73-7	2.33E-08	2.33E-08	7.99E-09				1.10E-08	1.10E-08								9.41E-05	9.41E-05	1.14E-05											**2.00E-04**
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.50E-08	1.50E-08	5.14E-09				7.06E-09	7.06E-09								3.04E-06	3.04E-06	1.47E-07											**6.28E-06**
Phenanathrene (POM)	85-01-8	1.42E-07	1.42E-07	4.85E-08				6.67E-08	6.67E-08								3.00E-04	3.00E-04	1.15E-05											**6.12E-04**
Pyrene (POM)	129-00-0	4.17E-08	4.17E-08	1.43E-08				1.96E-08	1.96E-08								2.73E-05	2.73E-05	1.87E-06											**5.65E-05**
Total HAPs		**0.016**	**0.016**	**0.005**	**0.004**	**0.036**	**0.036**	**0.007**	**0.007**	**2.305**	**1.390**	**0.444**	**0.100**	**0.444**	**0.100**	**0.187**	**0.012**	**0.012**	**0.002**	**0.079**	**0.001**	**3.43E-04**	**0.000**	**3.02E-06**	**0.006**	**1.62E-04**	**0.001**	**0.001**	**0.001**	**5.211**

HAP Summary (Annual)

Hazardous Air Pollutant Emissions Summary

Pollutant	CAS #	EU05 Refractory Burner #1 (tpy)	EU06 Refractory Burner #2 (tpy)	EU15 Pouring Furnace #1 (tpy)	EU18 Refractory Curing Mobile Burner (tpy)	EU39 PUCB Core Machine #1 (Resin) (tpy)	EU40 PUCB Core Machine #2 (Resin) (tpy)	EU44 Core Dryer #1 (tpy)	EU45 Core Dryer #2 (tpy)	HAPs Pouring Cooling Shakeout HAPs (Mold) (tpy)	HAPs Pouring Cooling Shakeout HAPs (Core) (tpy)	EU68 Paint Line #3 (Coating) (tpy)	EU68 Paint Line #3 (Thinner) (tpy)	EU69 Paint Line #2 (Coating) (tpy)	EU69 Paint Line #2 (Thinner) (tpy)	EU71 Paint Line #1 (tpy)	EU72 Emergency Generator #1 (tpy)	EU73 Emergency Generator #2 (tpy)	EU74 Emergency Generator #3 (tpy)	CU01 Melt Baghouse (CU01) (tpy)	CU02 Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02) (tpy)	CU06 Sand Plant Baghouse (CU06) (tpy)	CU08 Core/Mold Baghouse (CU08) (tpy)	CU10 Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10) (tpy)	CU11 Fettling Baghouse (CU11) (tpy)	CU12 Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12) (tpy)	CU13a-h Machining Cartridge Collectors (CU13a-h) (tpy)	CU13j Perforation Line #2 Cartridge Collector (CU13j) (tpy)	CU13i Perforation Line #1 Cartridge Collector (CU13i) (lb/hr)	TOTAL HAPs/TACs (tpy)
Antimony (Sb)	7440-36-0																													
Arsenic (As)	7440-38-2	7.30E-06	7.30E-06	2.50E-06	1.72E-06			3.44E-06	3.44E-06											6.52E-04	5.08E-06	2.67E-05	1.01E-05	2.35E-07	4.69E-05	1.31E-06	8.57E-06	4.29E-06	4.29E-06	**7.85E-04**
Beryllium (Be)	7440-41-7	4.38E-07	4.38E-07	1.50E-07	1.03E-07			2.06E-07	2.06E-07												3.57E-08	8.20E-06	3.30E-06	7.23E-08						**1.32E-05**
Cadmium (Cd)	7440-43-9	4.02E-05	4.02E-05	1.37E-05	9.45E-06			1.89E-05	1.89E-05											4.45E-04	3.47E-06	8.59E-07	6.93E-07	7.57E-09	2.09E-06	5.83E-08	3.81E-07	1.91E-07	1.91E-07	**5.95E-04**
Chromium (Cr)	7440-47-3	5.11E-05	5.11E-05	1.75E-05	1.20E-05			2.40E-05	2.40E-05											4.26E-03	3.32E-05	7.40E-05	7.24E-05	6.52E-07	3.29E-03	9.19E-05	6.01E-04	3.00E-04	3.00E-04	**9.20E-03**
Cobalt (Co)	7440-48-4	3.07E-06	3.07E-06	1.05E-06	7.21E-07			1.44E-06	1.44E-06											3.13E-04	2.44E-06	2.28E-05	1.05E-05	2.01E-07	6.29E-05	1.76E-06	1.15E-05	5.74E-06	5.74E-06	**4.48E-04**
Lead (Pb)	7439-92-1																			4.46E-02	3.47E-04	1.42E-04	5.71E-05	1.25E-06	4.40E-05	1.23E-06	8.04E-06	4.02E-06	4.02E-06	**4.52E-02**
Manganese (Mn)	7439-96-5	1.39E-05	1.39E-05	4.75E-06	3.26E-06			6.53E-06	6.53E-06											2.95E-01	2.30E-03	1.17E-03	1.55E-03	1.03E-05	2.09E-02	5.85E-04	3.82E-03	1.91E-03	1.91E-03	**3.29E-01**
Mercury (Hg)	7439-97-6	9.49E-06	9.49E-06	3.25E-06	2.23E-06			4.47E-06	4.47E-06																					**3.34E-05**
Nickel (Ni)	7440-02-0	7.67E-05	7.67E-05	2.62E-05	1.80E-05			3.61E-05	3.61E-05											1.23E-03	9.60E-06	4.95E-05	3.15E-05	4.37E-07	9.07E-04	2.53E-05	1.66E-04	8.28E-05	8.28E-05	**2.86E-03**
Selenium (Se)	7782-49-2	8.76E-07	8.76E-07	3.00E-07	2.06E-07			4.12E-07	4.12E-07											2.32E-04	1.80E-06	1.26E-05		1.11E-07	4.50E-05	1.26E-06	8.22E-06	4.11E-06	4.11E-06	**3.12E-04**
1,2,4 Trimethylbenzene	95-63-6																													
1,3-Butadiene	106-99-0																		7.66E-07											**7.66E-07**
Acenaphthene (POM)	83-32-9	6.57E-08	6.57E-08	2.25E-08	1.55E-08			3.09E-08	3.09E-08								1.72E-06	1.72E-06	2.78E-08											**3.70E-06**
Acenaphthylene (POM)	208-96-8	6.57E-08	6.57E-08	2.25E-08	1.55E-08			3.09E-08	3.09E-08								3.39E-06	3.39E-06	9.92E-08											**7.11E-06**
Acetaldehyde	75-07-0									1.80E-01							9.26E-06	9.26E-06	1.50E-05											**1.80E-01**
Acetophenone	98-86-2																													
Acrolein	107-02-8																2.90E-06	2.90E-06	1.81E-06											**7.60E-06**
Aniline	62-53-3																													
Anthracene (POM)	120-12-7	8.76E-08	8.76E-08	3.00E-08	2.06E-08			4.12E-08	4.12E-08								4.52E-07	4.52E-07	3.67E-08											**1.25E-06**
Benzene	71-43-2	7.67E-05	7.67E-05	2.62E-05	1.80E-05			3.61E-05	3.61E-05	2.91E+00	6.78E-01	3.60E-03		3.60E-03			2.85E-04	2.85E-04	1.83E-05											**3.60E+00**
Cresol	1319-77-3																													
Cumene	98-82-8											2.16E-02	2.15E-02	2.16E-02	2.15E-02															**8.61E-02**
Dibenzofurans	132-64-9																													
Dichlorobenzene	25321-22-6	4.38E-05	4.38E-05	1.50E-05	1.03E-05			2.06E-05	2.06E-05																					**1.54E-04**
Ethyl Benzene	100-41-4									1.99E-01	4.82E-03	3.42E-01	1.32E-01	3.42E-01	1.32E-01															**1.15E+00**
Formaldehyde	50-00-0	2.74E-03	2.74E-03	9.37E-04	6.44E-04	5.69E-03	5.69E-03	1.29E-03	1.29E-03								2.90E-05	2.90E-05	2.31E-05											**2.11E-02**
Hexane	110-54-3	6.57E-02	6.57E-02	2.25E-02	1.55E-02			3.09E-02	3.09E-02																					**2.31E-01**
Hydrogen Flouride	7664-39-3																													
Methanol	67-56-1															3.40E-01														**3.40E-01**
Methyl Chloride	74-87-3																													
Methylene diphenyl diisocyanate (MDI)	101-68-8																													
m-Xylene	108-38-3																													
Naphthalene	91-20-3	2.23E-05	2.23E-05	7.62E-06	5.24E-06	3.70E-02	3.70E-02	1.05E-05	1.05E-05		1.80E-01						4.78E-05	4.78E-05	1.66E-06											**2.54E-01**
Nitrobenzene	98-95-3																													
o-Cresol	95-48-7																													
o-Xylene	95-47-6																													
Phenol	108-95-2					2.31E-02	2.31E-02				1.52E+00																			**1.56E+00**
Propionaldehyde	123-38-6																													
P-Xylene	106-42-3																													
Styrene	100-42-5																													
Toluene	108-88-3	1.24E-04	1.24E-04	4.25E-05	2.92E-05			5.84E-05	5.84E-05	1.64E+00	9.47E-02	7.20E-03		7.20E-03			1.03E-04	1.03E-04	8.02E-06											**1.75E+00**
Xylenes	1330-20-7									1.21E+00	2.73E-02	1.40E+00	2.48E-01	1.40E+00	2.48E-01		7.09E-05	7.09E-05	5.59E-06											**4.54E+00**
2-Methylnaphthalene (POM)	91-57-6	8.76E-07	8.76E-07	3.00E-07				4.12E-07	4.12E-07																					**2.88E-06**
3-Methylchloranthrene (POM)	56-49-5	6.57E-08	6.57E-08	2.25E-08				3.09E-08	3.09E-08																					**2.16E-07**
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	5.84E-07	5.84E-07	2.00E-07				2.75E-07	2.75E-07																					**1.92E-06**
Benz(a)anthracene (POM)	56-55-3	6.57E-08	6.57E-08	2.25E-08				3.09E-08	3.09E-08								2.29E-07	2.29E-07	3.29E-08											**7.06E-07**
Benzo(a)pyrene (POM)	50-32-8	4.38E-08	4.38E-08	1.50E-08				2.06E-08	2.06E-08								9.44E-08	9.44E-08	3.68E-09											**3.36E-07**
Benzo(b)fluoranthene (POM)	205-99-2	6.57E-08	6.57E-08	2.25E-08				3.09E-08	3.09E-08								4.08E-07	4.08E-07	1.94E-09											**1.03E-06**
Benzo(g,h,i)perylene (POM)	191-24-2	4.38E-08	4.38E-08	1.50E-08				2.06E-08	2.06E-08								2.04E-07	2.04E-07	9.58E-09											**5.62E-07**
Benzo(k)fluoranthene (POM)	207-08-9	6.57E-08	6.57E-08	2.25E-08				3.09E-08	3.09E-08								8.01E-08	8.01E-08	3.04E-09											**3.79E-07**
Chrysene (POM)	218-01-9	6.57E-08	6.57E-08	2.25E-08				3.09E-08	3.09E-08								5.62E-07	5.62E-07	6.92E-09											**1.35E-06**
Dibenzo(a,h)anthracene (POM)	53-70-3	4.38E-08	4.38E-08	1.50E-08				2.06E-08	2.06E-08								1.27E-07	1.27E-07	1.14E-08											**4.10E-07**
Fluoranthene (POM)	206-44-0	1.10E-07	1.10E-07	3.75E-08				5.15E-08	5.15E-08								1.48E-06	1.48E-06	1.49E-07											**3.47E-06**
Fluorene (POM)	86-73-7	1.02E-07	1.02E-07	3.50E-08				4.81E-08	4.81E-08								4.70E-06	4.70E-06	5.72E-07											**1.03E-05**
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	6.57E-08	6.57E-08	2.25E-08				3.09E-08	3.09E-08								1.52E-07	1.52E-07	7.35E-09											**5.27E-07**
Phenanathrene (POM)	85-01-8	6.21E-07	6.21E-07	2.12E-07				2.92E-07	2.92E-07								1.50E-05	1.50E-05	5.76E-07											**3.26E-05**
Pyrene (POM)	129-00-0	1.83E-07	1.83E-07	6.25E-08				8.59E-08	8.59E-08								1.36E-06	1.36E-06	9.37E-08											**3.42E-06**
Total HAPs		**0.069**	**0.069**	**0.024**	**0.016**	**0.066**	**0.066**	**0.032**	**0.032**	**6.146**	**2.500**	**1.775**	**0.401**	**1.775**	**0.401**	**0.340**	**0.001**	**0.001**	**7.59E-05**	**0.347**	**0.003**	**0.002**	**0.002**	**1.32E-05**	**0.025**	**0.001**	**0.005**	**0.002**		**14.099**

Facility Summary (Hourly)

PROCESS	EU ID	Stack ID	Emissions Estimates - PSD Regulated Pollutants lbs/hr PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO2e	
Charge Handling	EU01	ST02										Note 1
Refractory Burner #1	EU05	ST02				0.005	0.833	0.046	0.700	0.000	1000.000	Note 1,5
Refractory Burner #2	EU06	ST02				0.005	0.833	0.046	0.700	0.000	1000.000	Note 1,5
Induction Furnace #1	EU07	ST02						2.341	13.944			Note 1,5
Induction Furnace #2	EU08	ST02						2.341	13.944			Note 1,5
Induction Furnace #3	EU09	ST02						2.341	13.944			Note 1,5
Induction Furnace #4	EU10	ST02						2.341	13.944			Note 1,5
Hot Metal Transfer	EU13	ST02										Note 1
Pouring Furnace #1	EU15	ST02				*0.002*	*0.285*	*0.016*	*0.240*	*0.000*	*342.353*	Note 1,5
Melt and Core/Mold Baghouse Dust Silo	EU17	ST03										Note 1
Refractory Curing Mobile Burner	EU18	ST02				*0.001*	*0.196*	*0.011*	*0.165*	*0.000*	*235.294*	Note 1,5
Mold Silica Sand Silo	EU19	ST04										Note 1
Blend Silo	EU20	ST05										Note 1
Bentonite Silo	EU21	ST06										Note 1
Mold Sand Handling and Preparation	EU22	ST07										Note 1
Mold Making #1	EU33	ST09										Note 1
Core Silica Sand Silo A	EU35A	ST09										Note 6
Core Silica Sand Silo B	EU35B	ST09										Note 6
Core Sand Handling and Preparation	EU36	ST09										Note 1
PUCB Core Machine #1(Resin)	EU39	ST09						0.104				Note 1,5
PUCB Core Machine #1(Resin+Cat)	EU39	ST08						0.624				Note 1,5
PUCB Core Machine #1 (Core Release)	EU39	ST08						3.570				Note 5
PUCB Core Machine #2(Resin)	EU40	ST09						0.104				Note 1,5
PUCB Core Machine #2(Resin+Cat)	EU40	ST08						0.624				Note 1,5
PUCB Core Machine #2 (Core Release)	EU40	ST08						3.570				Note 5
Core Wash Station #1	EU43	ST09						*0.675*				Note 5
Core Dryer #1	EU44	ST09				*0.002*	*0.392*	*0.022*	*0.329*	*0.000*	*470.588*	Note 1,5
Core Dryer #2	EU45	ST09				*0.002*	*0.392*	*0.022*	*0.329*	*0.000*	*470.588*	Note 1,5
Pouring #1	EU50	ST09				*0.300*	*0.150*	*53.101*	*92.488*	*0.007*		Note 1,5
Mold Cooling	EU52	ST09										
Shakeout Conveyor	EU53	ST07						*9.240*	*7.725*			Note 1,5
Sand Plant Waste Sand Silo	EU57	ST11										Note 1
Casting Cooling	EU59	ST09										Note 1
Sorting Conveyor	EU60	ST12										Note 1
Steel Shot Blasting #1	EU61	ST12										Note 1
Fettling Baghouse Waste Dust Silo	EU63	ST13										Note 1
Auto Grinding #1	EU64	ST12										Note 1
Auto Grinding #2	EU65	ST12										Note 1
Machining Lines (9)	EU66	ST16										Note 6
Perforation Line #2	EU67	ST16										Note 6
Paint Line #3 (Coating)	EU68	ST15A						*2.430*				Note 1,5
Paint Line #3 (Thinner)	EU68	ST15A						*1.000*				Note 5
Paint Line #2(Coating)	EU69	ST15B						*2.430*				Note 1,5
Paint Line #2(Thinner)	EU69	ST15B						*1.000*				Note 5
Paint Line #1	EU71	ST16						*0.992*				Note 1,5
Emergency Generator #1	EU72	STG1	*5.12E-01*	*5.12E-01*	*5.12E-01*	*1.11E+01*	*2.35E+01*	*6.62E-01*	*6.25E+00*		*1.21E+03*	
Emergency Generator #2	EU73	STG2	*5.12E-01*	*5.12E-01*	*5.12E-01*	*1.12E+01*	*2.35E+01*	*6.62E-01*	*6.25E+00*		*1.21E+03*	
Emergency Generator #3	EU74	STG3	*1.22E-01*	*1.22E-01*	*1.22E-01*	*1.14E-01*	*1.73E+00*	*1.37E-01*	*3.72E-01*		*6.43E+01*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Snag Grinder #1	EU77	ST12										Note 6
Snag Grinder #2	EU78	ST12										Note 6
Core Wash Station #2	EU79	ST09						*0.675*				Note 5
Rust Prohibitive Application	EU82	ST16						*2.500*				Note 5
Rotary Sprue Cleaner and Conveyors	EU83	ST12										Note 1,4
Perforation Line #1	EU84	ST16										Note 6
Total Emissions			**1.15**	**1.15**	**1.15**	**22.74**	**51.85**	**94.54**	**171.32**	**0.01**	**6008.61**	Note 3
Melt Baghouse (CU01)	CU01	ST02	1.982	1.982	1.982	0.013	2.148	9.481	57.581	0.000	2577.647	
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)	CU02	ST03	0.015	0.015	0.015							
Mold Silica Sand Silo Bin Vent Filter (CU03)	CU03	ST04	0.015	0.015	0.015							
Blend Silo Bin Vent Filter (CU04)	CU04	ST05	0.015	0.015	0.015							
Bentonite Silo Bin Vent Filter (CU05)	CU05	ST06	0.015	0.015	0.015							
Sand Plant Baghouse (CU06)	CU06	ST07	1.750	1.750	1.750			9.240	7.725			
Acid Scrubber (CU07)	CU07	ST08	0.032	0.032	0.032			8.388				
Core/Mold Baghouse (CU08)	CU08	ST09	1.425	1.425	1.425	0.305	0.934	54.703	93.147	0.007	941.176	
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)	CU10	ST11	*0.015*	*0.015*	*0.015*							
Fettling Baghouse (CU11)	CU11	ST12	0.552	0.552	0.552							
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)	CU12	ST13	0.015	0.015	0.015							
Machining Cartridge Collectors (CU13a-h)	CU13a-h	ST16	0.101	0.101	0.101							Note 2
Perforation Line #2 Cartridge Collector (CU13j)	CU13j	ST16	0.050	0.050	0.050							Note 2
Perforation Line #1 Cartridge Collector (CU13i)	CU13i	ST16	0.050	0.050	0.050							Note 2
Paint Line #3 Booth Filter (CU14)	CU14	ST15A	0.064	0.064	0.064			3.430				
Paint Line #2 Booth Filter (CU15)	CU15	ST15B	0.064	0.064	0.064			3.430				
Paint Line #1 Booth Filter (CU17)	CU17	ST16	0.587	0.587	0.587			3.492				
Core Silica Sand Silo A Bin Vent Filter (CU19)	CU19	ST09	0.015	0.015	0.015							Note 2
Core Silica Sand Silo B Bin Vent Filter (CU20)	CU20	ST09	0.015	0.015	0.015							Note 2
Snag Grinder #1 Fabric Filter (CU21)	CU21	ST12	0.039	0.039	0.039							Note 2
Snag Grinder #2 Fabric Filter (CU22)	CU22	ST12	0.039	0.039	0.039							Note 2
Emergency Generator #1	EU72	STG1	*5.12E-01*	*5.12E-01*	*5.12E-01*	*1.11E+01*	*2.35E+01*	*6.62E-01*	*6.25E+00*		*1.21E+03*	
Emergency Generator #2	EU73	STG2	*5.12E-01*	*5.12E-01*	*5.12E-01*	*1.12E+01*	*2.35E+01*	*6.62E-01*	*6.25E+00*		*1.21E+03*	
Emergency Generator #3	EU74	STG3	*1.22E-01*	*1.22E-01*	*1.22E-01*	*1.14E-01*	*1.73E+00*	*1.37E-01*	*3.72E-01*		*6.43E+01*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Total Emissions			**6.55**	**6.55**	**6.55**	**0.32**	**3.08**	**93.08**	**158.45**	**0.01**	**3518.82**	Note 3

Note 1: PM, PM_{10} and $PM_{2.5}$ emissions are included in the emissions from the air pollution control device vented to the identified stack.

Note 2: Emissions from this air pollution control device are emitted inside the facility and assumed captured via a second air pollution control device associated with the identified stack. "Total Emissions" do not include these units but are assumed to be a portion of the emissions associated with the stack of the secondary air pollution control device.

Note 3: "Total Emissions" do not include the emissions from the emergency generators.

Note 4: Emissions are captured by CU08 and CU11; emissions assigned to CU11 for worksheet construction.

Facility Summary (Annual)

PROCESS	EU ID	Stack ID	Emissions Estimates - PSD Regulated Pollutants (Tons/Year) PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO2e	
Charge Handling	EU01	ST02										Note 1
Refractory Burner #1	EU05	ST02				0.022	3.650	0.201	3.066	1.83E-05	4380.000	Note 1,5
Refractory Burner #2	EU06	ST02				0.022	3.650	0.201	3.066	1.83E-05	4380.000	Note 1,5
Induction Furnace #1	EU07	ST02						2.341	13.944			Note 1,5
Induction Furnace #2	EU08	ST02						2.341	13.944			Note 1,5
Induction Furnace #3	EU09	ST02						2.341	13.944			Note 1,5
Induction Furnace #4	EU10	ST02						2.341	13.944			Note 1,5
Hot Metal Transfer	EU13	ST02										Note 1
Pouring Furnace #1	EU15	ST02				*0.007*	*1.250*	*0.069*	*1.050*	*6.25E-06*	*1499.506*	Note 1,5
Melt and Core/Mold Baghouse Dust Silo	EU17	ST03										Note 1
Refractory Curing Mobile Burner	EU18	ST02				*0.005*	*0.859*	*0.047*	*0.721*	*4.29E-06*	*1030.588*	Note 1,5
Mold Silica Sand Silo	EU19	ST04										Note 1
Blend Silo	EU20	ST05										Note 1
Bentonite Silo	EU21	ST06										Note 1
Mold Sand Handling and Preparation	EU22	ST07										Note 1
Mold Making #1	EU33	ST09										Note 1
Core Silica Sand Silo A	EU35A	ST09										Note 6
Core Silica Sand Silo B	EU35B	ST09										Note 6
Core Sand Handling and Preparation	EU36	ST09										Note 1
PUCB Core Machine #1(Resin)	EU39	ST09						0.189				Note 1,5
PUCB Core Machine #1(Resin+Cat)	EU39	ST08						1.128				Note 1,5
PUCB Core Machine #1 (Core Release)	EU39	ST08						6.545				Note 5
PUCB Core Machine #2(Resin)	EU40	ST09						0.189				Note 1,5
PUCB Core Machine #2(Resin+Cat)	EU40	ST08						*1.128*				Note 1,5
PUCB Core Machine #2 (Core Release)	EU40	ST08						*6.545*				Note 5
Core Wash Station #1	EU43	ST09						*0.135*				Note 5
Core Dryer #1	EU44	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2061.176*	Note 1,5
Core Dryer #2	EU45	ST09				*0.010*	*1.718*	*0.094*	*1.443*	*8.59E-06*	*2061.176*	Note 1,5
Pouring #1	EU50	ST09				*0.800*	*0.400*	*141.604*	*246.634*	*1.92E-02*		Note 1,5
Mold Cooling	EU52	ST09										
Shakeout Conveyor	EU53	ST07						*24.640*	*20.600*			Note 1,5
Sand Plant Waste Sand Silo	EU57	ST11										Note 1
Casting Cooling	EU59	ST09										Note 1
Sorting Conveyor	EU60	ST12										Note 1
Steel Shot Blasting #1	EU61	ST12										Note 1
Fettling Baghouse Waste Dust Silo	EU63	ST13										Note 1
Auto Grinding #1	EU64	ST12										Note 1
Auto Grinding #2	EU65	ST12										Note 1
Machining Lines (9)	EU66	ST16										Note 6
Perforation Line #2	EU67	ST16										Note 6
Paint Line #3 (Coating)	EU68	ST15A						9.720				Note 1,5
Paint Line #3 (Thinner)	EU68	ST15A						4.000				Note 5
Paint Line #2(Coating)	EU69	ST15B						*9.720*				Note 1,5
Paint Line #2(Thinner)	EU69	ST15B						*4.000*				Note 5
Paint Line #1	EU71	ST16						*1.804*				Note 1,5
Emergency Generator #1	EU72	STG1	*2.56E-02*	*2.56E-02*	*2.56E-02*	*5.57E-01*	*1.18E+00*	*3.31E-02*	*3.12E-01*		*6.06E+01*	
Emergency Generator #2	EU73	STG2	*2.56E-02*	*2.56E-02*	*2.56E-02*	*5.59E-01*	*1.18E+00*	*3.31E-02*	*3.12E-01*		*6.06E+01*	
Emergency Generator #3	EU74	STG3	*6.08E-03*	*6.08E-03*	*6.08E-03*	*5.68E-03*	*8.64E-02*	*6.86E-03*	*1.86E-02*		*3.21E+00*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Snag Grinder #1	EU77	ST12										Note 6
Snag Grinder #2	EU78	ST12										Note 6
Core Wash Station #2	EU79	ST09						*0.135*				Note 5
Rust Prohibitive Application	EU82	ST16						*1.000*				Note 5
Rotary Sprue Cleaner and Conveyors	EU83	ST12										Note 1,4
Perforation Line #1	EU84	ST16										Note 6
Total Emissions			**0.06**	**0.06**	**0.06**	**2.00**	**15.68**	**223.54**	**334.44**	**0.02**	**15536.94**	Note 3
Melt Baghouse (CU01)	CU01	ST02	*8.683*	*8.683*	*8.683*	*0.056*	*9.408*	*9.880*	*63.680*	*4.70E-05*	*11290.094*	
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)	CU02	ST03	*0.068*	*0.068*	*0.068*							
Mold Silica Sand Silo Bin Vent Filter (CU03)	CU03	ST04	*0.0010*	*0.0010*	*0.0010*							
Blend Silo Bin Vent Filter (CU04)	CU04	ST05	*0.0010*	*0.0010*	*0.0010*							
Bentonite Silo Bin Vent Filter (CU05)	CU05	ST06	*0.0010*	*0.0010*	*0.0010*							
Sand Plant Baghouse (CU06)	CU06	ST07	*7.667*	*7.667*	*7.667*			*24.640*	*20.600*			
Acid Scrubber (CU07)	CU07	ST08	*0.138*	*0.138*	*0.138*			*15.346*				
Core/Mold Baghouse (CU08)	CU08	ST09	*6.241*	*6.241*	*6.241*	*0.821*	*3.835*	*142.440*	*249.520*	*0.019*	*4122.353*	
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)	CU10	ST11	*0.068*	*0.068*	*0.068*							
Fettling Baghouse (CU11)	CU11	ST12	*2.417*	*2.417*	*2.417*							
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)	CU12	ST13	*0.068*	*0.068*	*0.068*							
Machining Cartridge Collectors (CU13a-h)	CU13a-h	ST16	*0.442*	*0.442*	*0.442*							Note 2
Perforation Line #2 Cartridge Collector (CU13j)	CU13j	ST16	*0.221*	*0.221*	*0.221*							Note 2
Perforation Line #1 Cartridge Collector (CU13i)	CU13i	ST16	*0.221*	*0.221*	*0.221*							Note 2
Paint Line #3 Booth Filter (CU14)	CU14	ST15A	*0.279*	*0.279*	*0.279*			*13.720*				
Paint Line #2 Booth Filter (CU15)	CU15	ST15B	*0.279*	*0.279*	*0.279*			*13.720*				
Paint Line #1 Booth Filter (CU17)	CU17	ST16	*2.572*	*2.572*	*2.572*			*2.804*				
Core Silica Sand Silo A Bin Vent Filter (CU19)	CU19	ST09	*0.001*	*0.001*	*0.001*							Note 2
Core Silica Sand Silo B Bin Vent Filter (CU20)	CU20	ST09	*0.001*	*0.001*	*0.001*							Note 2
Snag Grinder #1 Fabric Filter (CU21)	CU21	ST12	*0.169*	*0.169*	*0.169*							Note 2
Snag Grinder #2 Fabric Filter (CU22)	CU22	ST12	*0.169*	*0.169*	*0.169*							Note 2
Emergency Generator #1	EU72	STG1	*2.56E-02*	*2.56E-02*	*2.56E-02*	*5.57E-01*	*1.18E+00*	*3.31E-02*	*3.12E-01*		*6.06E+01*	
Emergency Generator #2	EU73	STG2	*2.56E-02*	*2.56E-02*	*2.56E-02*	*5.59E-01*	*1.18E+00*	*3.31E-02*	*3.12E-01*		*6.06E+01*	
Emergency Generator #3	EU74	STG3	*6.08E-03*	*6.08E-03*	*6.08E-03*	*5.68E-03*	*8.64E-02*	*6.86E-03*	*1.86E-02*		*3.21E+00*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Total Emissions			**28.48**	**28.48**	**28.48**	**0.88**	**13.24**	**223.47**	**333.80**	**0.02**	**15412.45**	Note 3
Total Emissions			**28.48**	**28.48**	**28.48**	**0.88**	**13.24**	**223.47**	**333.80**	**0.02**	**15412.45**	Note 3

Note 1: PM, PM_{10} and $PM_{2.5}$ emissions are included in the emissions from the air pollution control device vented to the identified stack.

Note 2: Emissions from this air pollution control device are emitted inside the facility and assumed captured via a second air pollution control device associated with the identified stack. "Total Emissions" do not include these units but are assumed to be a portion of the emissions associated with the stack of the secondary air pollution control device.

Note 3: "Total Emissions" do not include the emissions from the emergency generators.

Note 4: Emissions are captured by CU08 and CU11; emissions assigned to CU11 for worksheet construction.

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 6

Flow Diagram Designation
Charge Handling
EU01

Maximum Hourly Capacity
15.00 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Charge Handling
Control Device: Melt Baghouse (CU01) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Charge Handling										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		0.07	0.07	0.06						
(source)		Note 1	Note 1	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Gutow Article, Modern Casting; January 1972; PM emissions from Raw material handling (0.04 lbs/ton) and charge makeup (0.03 lbs/ton) released to the atmosphere. All PM emission were conservatively assumed to be PM-10 emissions.
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to $PM_{2.5}$ ratio and uncontrolled PM emission factor.
Note 3: The Alloy Storage emission unit (EU02) is included in this emission unit.
Note 4: Secondary capture of fugitive emissions per testing conducted pursuant to permit term EG01,3.I
Note 5: Hourly capacity based on potential Pouring (EU50) throughput rate
Note 6: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Charge Handling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Applicaiton
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
73.00 MMCF/Year Note 3

Flow Diagram Designation
Refractory Burner #1
EU05

Maximum Hourly Capacity
0.008 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Refractory Burner #1
Control Device: Melt Baghouse (CU01) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Refractory Burner #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1,4,5	Note 1,4,5	Note 1,4,5	Note 1,4,5	Note 1,4,5	Note 1,4,5	Note 1,4,5	Note 1,4,5	Note 1,4,5
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions			0.005	0.833	0.046	0.700	4.17E-06	1000.000
	Annual (TPY)					**0.022**	**3.650**	**0.201**	**3.066**	**1.83E-05**	**4380.000**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)					0.005	0.833	0.046	0.700	4.17E-06	1000.000
	Annual (TPY)					**0.022**	**3.650**	**0.201**	**3.066**	**1.83E-05**	**4380.000**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 8.5 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Applicaiton
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Refractory Burner #1

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			1.67E-06	7.30E-06	**1.67E-06**	**7.30E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			1.00E-07	4.38E-07	**1.00E-07**	**4.38E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			9.17E-06	4.02E-05	**9.17E-06**	**4.02E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			1.17E-05	5.11E-05	**1.17E-05**	**5.11E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			7.00E-07	3.07E-06	**7.00E-07**	**3.07E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			3.17E-06	1.39E-05	**3.17E-06**	**1.39E-05**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			2.17E-06	9.49E-06	**2.17E-06**	**9.49E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			1.75E-05	7.67E-05	**1.75E-05**	**7.67E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			2.00E-07	8.76E-07	**2.00E-07**	**8.76E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			2.00E-08	8.76E-08	**2.00E-08**	**8.76E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			1.75E-05	7.67E-05	**1.75E-05**	**7.67E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			1.00E-05	4.38E-05	**1.00E-05**	**4.38E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			6.25E-04	2.74E-03	**6.25E-04**	**2.74E-03**	Note 1
Hexane	110-54-3	1.80E+00			1.50E-02	6.57E-02	**1.50E-02**	**6.57E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			5.08E-06	2.23E-05	**5.08E-06**	**2.23E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			2.83E-05	1.24E-04	**2.83E-05**	**1.24E-04**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			2.00E-07	8.76E-07	**2.00E-07**	**8.76E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			1.33E-07	5.84E-07	**1.33E-07**	**5.84E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			2.50E-08	1.10E-07	**2.50E-08**	**1.10E-07**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			2.33E-08	1.02E-07	**2.33E-08**	**1.02E-07**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			1.42E-07	6.21E-07	**1.42E-07**	**6.21E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			4.17E-08	1.83E-07	**4.17E-08**	**1.83E-07**	Note 1,3
	Total HAPs				1.57E-02	6.89E-02	**1.57E-02**	**6.89E-02**	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
73.00 MMCF/Year Note 3

Flow Diagram Designation
Refractory Burner #2
EU06

Maximum Hourly Capacity
0.008 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Refractory Burner #2
Control Device: Melt Baghouse (CU01) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Refractory Burner #2										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1,4,5	Note 1,4,5	Note 1,4,5	Note 1,4,5	Note 1,4,5	Note 1,4,5	Note 1,4,5	Note 1,4,5	Note 1,4,5
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions			0.005	0.833	0.046	0.700	4.17E-06	1000.000
	Annual (TPY)					**0.022**	**3.650**	**0.201**	**3.066**	**1.83E-05**	**4380.000**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)					0.005	0.833	0.046	0.700	4.17E-06	1000.000
	Annual (TPY)					**0.022**	**3.650**	**0.201**	**3.066**	**1.83E-05**	**4380.000**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 8.5 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Refractory Burner #2

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			1.67E-06	7.30E-06	**1.67E-06**	**7.30E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			1.00E-07	4.38E-07	**1.00E-07**	**4.38E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			9.17E-06	4.02E-05	**9.17E-06**	**4.02E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			1.17E-05	5.11E-05	**1.17E-05**	**5.11E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			7.00E-07	3.07E-06	**7.00E-07**	**3.07E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			3.17E-06	1.39E-05	**3.17E-06**	**1.39E-05**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			2.17E-06	9.49E-06	**2.17E-06**	**9.49E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			1.75E-05	7.67E-05	**1.75E-05**	**7.67E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			2.00E-07	8.76E-07	**2.00E-07**	**8.76E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			2.00E-08	8.76E-08	**2.00E-08**	**8.76E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			1.75E-05	7.67E-05	**1.75E-05**	**7.67E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			1.00E-05	4.38E-05	**1.00E-05**	**4.38E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			6.25E-04	2.74E-03	**6.25E-04**	**2.74E-03**	Note 1
Hexane	110-54-3	1.80E+00			1.50E-02	6.57E-02	**1.50E-02**	**6.57E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			5.08E-06	2.23E-05	**5.08E-06**	**2.23E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			2.83E-05	1.24E-04	**2.83E-05**	**1.24E-04**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			2.00E-07	8.76E-07	**2.00E-07**	**8.76E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			1.33E-07	5.84E-07	**1.33E-07**	**5.84E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			2.50E-08	1.10E-07	**2.50E-08**	**1.10E-07**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			2.33E-08	1.02E-07	**2.33E-08**	**1.02E-07**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			1.42E-07	6.21E-07	**1.42E-07**	**6.21E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			4.17E-08	1.83E-07	**4.17E-08**	**1.83E-07**	Note 1,3
	Total HAPs				1.57E-02	6.89E-02	**1.57E-02**	**6.89E-02**	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
20,000 Tons/Year Note 7

Flow Diagram Designation
Induction Furnace #1
EU07

Maximum Hourly Capacity
10.00 Tons/Hour Note 6

Process Description:
Fritz Winter North America, LP
Induction Furnace #1
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.234	1.394		
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions					2.341	13.944		
	Annual (TPY)						**2.341**	**13.944**		
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						2.341	13.944		
	Annual (TPY)						**2.341**	**13.944**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: Based on upper 95th% Confidence Interval of 2020 and 2024 CU01_ST02 stack test results; considering other units vented to this stack
Note 4: See HAPs calculations provided on air pollution control device worksheet
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 6: Equipment hourly capacity
Note 7: 1/4 of the requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
20,000 Tons/Year Note 7

Flow Diagram Designation
Induction Furnace #2
EU08

Maximum Hourly Capacity
10.00 Tons/Hour Note 6

Process Description:
Fritz Winter North America, LP
Induction Furnace #2
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.23	1.39		
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions					2.341	13.944		
	Annual (TPY)						**2.341**	**13.944**		
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						2.341	13.944		
	Annual (TPY)						**2.341**	**13.944**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: Based on upper 95th% Confidence Interval of 2020 and 2024 CU01_ST02 stack test results; considering other units vented to this stack
Note 4: See HAPs calculations provided on air pollution control device worksheet
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 6: Equipment hourly capacity
Note 7: 1/4 of the requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
20,000 Tons/Year Note 7

Flow Diagram Designation
Induction Furnace #3
EU09

Maximum Hourly Capacity
10.00 Tons/Hour Note 6

Process Description:
Fritz Winter North America, LP
Induction Furnace #3
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #3									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.23	1.39		
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions					2.341	13.944		
	Annual (TPY)						**2.341**	**13.944**		
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						2.341	13.944		
	Annual (TPY)						**2.341**	**13.944**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: Based on upper 95th% Confidence Interval of 2020 and 2024 CU01_ST02 stack test results; considering other units vented to this stack
Note 4: See HAPs calculations provided on air pollution control device worksheet
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 6: Equipment hourly capacity
Note 7: 1/4 of the requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #3

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
20,000 Tons/Year Note 7

Flow Diagram Designation
Induction Furnace #4
EU10

Maximum Hourly Capacity
10.00 Tons/Hour Note 6

Process Description:
Fritz Winter North America, LP
Induction Furnace #4
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #4									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.23	1.39		
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions					2.341	13.944		
	Annual (TPY)						**2.341**	**13.944**		
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						2.341	13.944		
	Annual (TPY)						**2.341**	**13.944**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: Based on upper 95th% Confidence Interval of 2020 and 2024 CU01_ST02 stack test results; considering other units vented to this stack
Note 4: See HAPs calculations provided on air pollution control device worksheet
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 6: Equipment hourly capacity
Note 7: 1/4 of the requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #4

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 5

Flow Diagram Designation
Hot Metal Transfer
EU13

Maximum Hourly Capacity
15.00 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Hot Metal Transfer
Control Device: Melt Baghouse (CU01) Note 3
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:	**Criteria Pollutants**								
Hot Metal Transfer									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	0.056	0.052	0.046						
(source)	Note 1	Note 2	Note 2						
Capture Efficiency	100.00	100.00	100.00						
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
Annual (TPY)									
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Hot metal transfer at building monitor. AP-42, Ch. 12-5, Table 12.5-1
Note 2: Emission factor based on USEPA PM Calculator $PM/PM_{10}/PM_{2.5}$ ratio and uncontrolled PM emission factor for SCC 30400320
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 4: Hourly capacity based on potential Pouring (EU50) throughput rate
Note 5: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Hot Metal Transfer

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
24.99 MMCF/Year Note 3

Flow Diagram Designation
Pouring Furnace #1
EU15

Maximum Hourly Capacity
0.0029 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Pouring Furnace #1
Control Device: Melt Baghouse (CU01) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Pouring Furnace #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions			0.002	0.285	0.016	0.240	1.43E-06	342.353
	Annual (TPY)					**0.007**	**1.250**	**0.069**	**1.050**	**6.25E-06**	**1499.506**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)					0.002	0.285	0.016	0.240	1.43E-06	342.353
	Annual (TPY)					**0.007**	**1.250**	**0.069**	**1.050**	**6.25E-06**	**1499.506**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 2.91 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Pouring Furnace #1

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			5.71E-07	2.50E-06	**5.71E-07**	**2.50E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			3.42E-08	1.50E-07	**3.42E-08**	**1.50E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			3.14E-06	1.37E-05	**3.14E-06**	**1.37E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			3.99E-06	1.75E-05	**3.99E-06**	**1.75E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			2.40E-07	1.05E-06	**2.40E-07**	**1.05E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			1.08E-06	4.75E-06	**1.08E-06**	**4.75E-06**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			7.42E-07	3.25E-06	**7.42E-07**	**3.25E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			5.99E-06	2.62E-05	**5.99E-06**	**2.62E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			6.85E-08	3.00E-07	**6.85E-08**	**3.00E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			6.85E-09	3.00E-08	**6.85E-09**	**3.00E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			5.99E-06	2.62E-05	**5.99E-06**	**2.62E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			3.42E-06	1.50E-05	**3.42E-06**	**1.50E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			2.14E-04	9.37E-04	**2.14E-04**	**9.37E-04**	Note 1
Hexane	110-54-3	1.80E+00			5.14E-03	2.25E-02	**5.14E-03**	**2.25E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			1.74E-06	7.62E-06	**1.74E-06**	**7.62E-06**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			9.70E-06	4.25E-05	**9.70E-06**	**4.25E-05**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			6.85E-08	3.00E-07	**6.85E-08**	**3.00E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			4.56E-08	2.00E-07	**4.56E-08**	**2.00E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			3.42E-09	1.50E-08	**3.42E-09**	**1.50E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			3.42E-09	1.50E-08	**3.42E-09**	**1.50E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			3.42E-09	1.50E-08	**3.42E-09**	**1.50E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			8.56E-09	3.75E-08	**8.56E-09**	**3.75E-08**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			7.99E-09	3.50E-08	**7.99E-09**	**3.50E-08**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			4.85E-08	2.12E-07	**4.85E-08**	**2.12E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			1.43E-08	6.25E-08	**1.43E-08**	**6.25E-08**	Note 1,3
	Total HAPs				5.39E-03	2.36E-02	**5.39E-03**	**2.36E-02**	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,323 Tons/Year Note 4

Flow Diagram Designation
Melt and Core/Mold Baghouse Dust Silo
EU17

Maximum Hourly Capacity
0.38 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Melt and Core/Mold Baghouse Dust Silo

Control Device: Melt and Core/Mold BHs Dust Silo Bin Vent Filter (CU02)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Melt and Core/Mold Baghouse Dust Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on mass balance of dust from serviced fabric filters
Note 4: Annual based on hourly times 8,760 hours per year

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Melt and Core/Mold Baghouse Dust Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
17.18 MMCF/Year Note 3

Flow Diagram Designation
Refractory Curing Mobile Burner
EU18

Maximum Hourly Capacity
0.002 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Refractory Curing Mobile Burner
Control Device: Melt Baghouse (CU01) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Refractory Curing Mobile Burner										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions			0.001	0.196	0.011	0.165	9.80E-07	235.294
	Annual (TPY)					**0.005**	**0.859**	**0.047**	**0.721**	**4.29E-06**	**1030.588**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)					0.001	0.196	0.011	0.165	9.80E-07	235.294
	Annual (TPY)					**0.005**	**0.859**	**0.047**	**0.721**	**4.29E-06**	**1030.588**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 2.0 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Refractory Curing Mobile Burner

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			3.92E-07	1.72E-06	**3.92E-07**	**1.72E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			2.35E-08	1.03E-07	**2.35E-08**	**1.03E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			2.16E-06	9.45E-06	**2.16E-06**	**9.45E-06**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			2.75E-06	1.20E-05	**2.75E-06**	**1.20E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			1.65E-07	7.21E-07	**1.65E-07**	**7.21E-07**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			7.45E-07	3.26E-06	**7.45E-07**	**3.26E-06**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			5.10E-07	2.23E-06	**5.10E-07**	**2.23E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			4.12E-06	1.80E-05	**4.12E-06**	**1.80E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			4.71E-08	2.06E-07	**4.71E-08**	**2.06E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			3.53E-09	1.55E-08	**3.53E-09**	**1.55E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			3.53E-09	1.55E-08	**3.53E-09**	**1.55E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			4.12E-06	1.80E-05	**4.12E-06**	**1.80E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			2.35E-06	1.03E-05	**2.35E-06**	**1.03E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			1.47E-04	6.44E-04	**1.47E-04**	**6.44E-04**	Note 1
Hexane	110-54-3	1.80E+00			3.53E-03	1.55E-02	**3.53E-03**	**1.55E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			1.20E-06	5.24E-06	**1.20E-06**	**5.24E-06**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			6.67E-06	2.92E-05	**6.67E-06**	**2.92E-05**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05							
3-Methylchloranthrene (POM)	56-49-5	1.80E-06							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05							
Benz(a)anthracene (POM)	56-55-3	1.80E-06							
Benzo(a)pyrene (POM)	50-32-8	1.20E-06							
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06							
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06							
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06							
Chrysene (POM)	218-01-9	1.80E-06							
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06							
Fluoranthene (POM)	206-44-0	3.00E-06							
Fluorene (POM)	86-73-7	2.80E-06							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06							
Phenanathrene (POM)	85-01-8	1.70E-05							
Pyrene (POM)	129-00-0	5.00E-06							
	Total HAPs				3.70E-03	1.62E-02	**3.70E-03**	**1.62E-02**	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
21,000 Tons/Year Note 4

Flow Diagram Designation
Mold Silica Sand Silo
EU19

Maximum Hourly Capacity
25.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Mold Silica Sand Silo
Control Device: Mold Silica Sand Silo Bin Vent Filter (CU03)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Mold Silica Sand Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Silica Sand Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
5,500 Tons/Year Note 4

Flow Diagram Designation
Blend Silo
EU20

Maximum Hourly Capacity
25.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Blend Silo
Control Device: Blend Silo Bin Vent Filter (CU04)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Blend Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Blend Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,500 Tons/Year Note 4

Flow Diagram Designation
Bentonite Silo
EU21

Maximum Hourly Capacity
25.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Bentonite Silo
Control Device: Bentonite Silo Bin Vent Filter (CU05)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Bentonite Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Bentonite Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
716,760 Tons/Year Note 5

Flow Diagram Designation
Mold Sand Handling and Preparation
EU22

Maximum Hourly Capacity
198.00 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Mold Sand Handling and Preparation
Control Device: Sand Plant Baghouse (CU06) Note 3
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Mold Sand Handling and Preparation										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	3.60	0.54	0.54						
(source)			Note 1	Note 1	Note 2						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-50
Note 2: Assumes PM2.5 is equal to PM10
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 4: Hourly equipment capacity
Note 5: Requested maximum tons of sand processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Sand Handling and Preparation

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Annual Actual Throughput
80,000 Tons/Year Note 6

Flow Diagram Designation
Mold Making #1
EU33

Hourly Actual Throughput
15.00 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Mold Making #1

Control Device: Core/Mold Baghouse (CU08) Note 3
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:	Criteria Pollutants								
Mold Making #1									
Emission Factor Basis:	PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:	0.04	0.04	0.04						
(source)	Note 1	Note 2	Note 2			Note 4			
Capture Efficiency	100.00	100.00	100.00						
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
Annual (TPY)									
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio RACM, Table 2.7-1
Note 2: PM_{10} and $PM_{2.5}$ assumed equal to PM.
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 4: Emissions from mold release (Zip-Slip LR57HP) quantified with pouring, cooling and shakeout
Note 5: Hourly capacity based on potential Pouring (EU50) throughput rate
Note 6: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Making #1

100.00

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,345 Tons/Year Note 4

Flow Diagram Designation
Core Silica Sand Silo A
EU35A

Maximum Hourly Capacity
25.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Core Silica Sand Silo A
Control Device: Core Silica Sand Silo A Bin Vent Filter (CU19)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Core Silica Sand Silo A									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Silica Sand Silo A

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,345 Tons/Year

Flow Diagram Designation
Core Silica Sand Silo B
EU35B

Maximum Hourly Capacity
25.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Core Silica Sand Silo B
Control Device: Core Silica Sand Silo B Bin Vent Filter (CU20)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Core Silica Sand Silo B									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Silica Sand Silo B

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
6,690 Tons/Year Note 5

Flow Diagram Designation
Core Sand Handling and Preparation
EU36

Maximum Hourly Capacity
1.86 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Core Sand Handling and Preparation

Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Core Sand Handling and Preparation										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.65	0.54	0.54						
(source)			Note 1	Note 2	Note 3						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AIRS Facility Subsystem SCC and EF Listing (EPA 450/4-90-003, March 1990)
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-50
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Hourly capacity based on potential core machines throughput rate
Note 5: Annual capacity based on potentail core machines throughput rate

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Sand Handling and Preparation

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

	Maximum Yearly Sand Capacity		Maximum Yearly Resin Capacity
	3,345 Tons/Year Note 7		40 Tons/Year Note 3,7
Flow Diagram Designation	Maximum Hourly Sand Capacity		Maximum Hourly Resin Capacity
PUCB Core Machine #1(Resin)	0.93 Tons/Hour Note 6		22.20 Lbs/Hour Note 3
EU39			
Process Description:			
Fritz Winter North America, LP			
PUCB Core Machine #1(Resin)			
Control Device:	Core/Mold Baghouse (CU08) Note 5		
SCC Code:			
Control Device Outlet:	gr/dscf		
Airflow:	acfm		
Stack Gas Temperature:	°F		

Facility Process Name:		Criteria Pollutants								
PUCB Core Machine #1(Resin)										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton sand	0.30	0.30	0.30			0.0047			
(source)		Note 1	Note 8	Note 8			Note 2,3,4			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions					0.104			
Annual (TPY)							**0.189**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							0.104			
Annual (TPY)							**0.189**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 2: Resin VOC EF at ST09: ASK Chemicals Vendor Test, June 2025, After Mixing (0.17g loss/36g resin total = 0.0047 lb/lb resin)
Note 3: ASK Chemicals Vendor Test based on 1.2% resin (based on sand); identical maximum rate used by FWNA
Note 4: Emission factor based on lb per lb resin
Note 5: VOC emissions are captured and exhausted to Core/Mold Baghouse (CU08)
Note 6: Hourly equipment capacity
Note 7: Requested rolling 12-month rolling processing rate
Note 8: Assumes PM_{10} and $PM_{2.5}$ equivalent to PM

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1(Resin)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	0.0034			3.15E-03	5.69E-03	**3.15E-03**	**5.69E-03**	Note 8
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0221			2.04E-02	3.70E-02	**2.04E-02**	**3.70E-02**	Note 8
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0138			1.28E-02	2.31E-02	**1.28E-02**	**2.31E-02**	Note 8
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs				3.64E-02	6.57E-02	3.64E-02	6.57E-02	

Note 8: CERP Report (Tecknikon #1409-123-EQ) December 2002, Table 3-2

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

	Maximum Yearly Sand Capacity	Maximum Yearly Resin Capacity	Maximum Yearly Catalyst Capacity
	3,345 Tons/Year	40 Tons/Year Note 4,8	6.02 Tons/Year Note 5,8
Flow Diagram Designation	Maximum Hourly Sand Capacity	Maximum Hourly Resin Capacity	Maximum Hourly Catalyst Capacity
PUCB Core Machine #1(Resin+Cat)	0.93 Tons/Hour	22.20 Lbs/Hour Note 4	3.33 Lbs/Hour Note 5
EU39			
Process Description:			
Fritz Winter North America, LP			
PUCB Core Machine #1(Resin+Cat)			
Control Device:	Acid Scrubber (CU07)	Note 6	
SCC Code:			
Control Device Outlet:	gr/dscf		
Airflow:	acfm		
Stack Gas Temperature:	°F		

Facility Process Name:	Criteria Pollutants								
PUCB Core Machine #1(Resin+Cat)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors: lb/ton sand	0.35	0.35	0.35			0.028			
(source)	Note 9	Note 10	Note 10			Note 1,2,3			
Capture Efficiency						100.00			
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	See air pollution control device worksheet for stack emissions					0.624			
Annual (TPY)						**1.128**			
d									
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)						0.624			
Annual (TPY)						**1.128**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ASK Chemicals Vendor Test, June 2025, 30 Mins and After (1.02g-0.17g)/36g)=0.0236 g/g binder, for 1.2% Resin Focus 109/209 system
Note 2: Catalyst usage based on 15% of resin; Catalyst 100% emitted; Acid Scrubber amine control efficiency is 97%; (3.33*(1-0.03))/22.22=0.0045 lb/lb resin
Note 3: Emission Factor - 0.236 + 0.0045 = 0.028; Emissions are on a lb/lb resin basis
Note 4: ASK Chemicals Vendor Test based on 1.2% resin (based on sand); identical maximum rate used by FWNA
Note 5: Maximimum catalyst usage is 15% of resin
Note 6: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)
Note 7: Hourly sand processing rate based on equipment capacity
Note 8: Requested rolling 12-month rolling processing rate
Note 9: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 10: Assumes PM_{10} and $PM_{2.5}$ equivalent to PM

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1(Resin+Cat)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Core Release Capacity
7.7 Tons/Year Note 3

Flow Diagram Designation
PUCB Core Machine #1 (Core Release)
EU39

Maximum Hourly Core Release Capacity
0.0021 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #1 (Core Release)

Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #1 (Core Release)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton						1700.000			
(source)							Note 1,2			
	Capture Efficiency						100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ACMOS 118-63 Core Release (84% VOC by weight per SDS and 1/3/2022 email)
HA NIxStix CB/NB Fast Dry (85% VOC per J. Krause 1/3/2022 email)
Note 2: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)
Note 3: Requested rolling 12-month rolling processing rate

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1 (Core Release)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

	Maximum Yearly Sand Capacity		Maximum Yearly Resin Capacity
	3,345 Tons/Year Note 7		40 Tons/Year Note 3,7
Flow Diagram Designation	Maximum Hourly Sand Capacity		Maximum Hourly Resin Capacity
PUCB Core Machine #1(Resin)	0.93 Tons/Hour Note 6		22.20 Lbs/Hour Note 3
EU39			
Process Description:			
Fritz Winter North America, LP			
PUCB Core Machine #1(Resin)			
Control Device:	Core/Mold Baghouse (CU08) Note 5		
SCC Code:			
Control Device Outlet:	gr/dscf		
Airflow:	acfm		
Stack Gas Temperature:	°F		

Facility Process Name:		Criteria Pollutants								
PUCB Core Machine #1(Resin)										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton sand	0.30	0.30	0.30			0.0047			
(source)		Note 1	Note 8	Note 8			Note 2,3,4			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions					0.104			
Annual (TPY)							**0.189**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							0.104			
Annual (TPY)							**0.189**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 2: Resin VOC EF at ST09: ASK Chemicals Vendor Test, June 2025, After Mixing (0.17g loss/36g resin total = 0.0047 lb/lb resin)
Note 3: ASK Chemicals Vendor Test based on 1.2% resin (based on sand); identical maximum rate used by FWNA
Note 4: Emission factor based on lb per lb resin
Note 5: VOC emissions are captured and exhausted to Mold/Core Baghouse (CU08)
Note 6: Hourly equipment capacity
Note 7: Requested rolling 12-month rolling processing rate
Note 8: Assumes PM_{10} and $PM_{2.5}$ equivalent to PM

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1(Resin)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	0.0034			3.15E-03	5.69E-03	**3.15E-03**	**5.69E-03**	Note 8
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0221			2.04E-02	3.70E-02	**2.04E-02**	**3.70E-02**	Note 8
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0138			1.28E-02	2.31E-02	**1.28E-02**	**2.31E-02**	Note 8
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs				3.64E-02	6.57E-02	3.64E-02	6.57E-02	

Note 8: CERP Report (Tecknikon #1409-123-EQ) December 2002, Table 3-2

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

	Maximum Yearly Sand Capacity	Maximum Yearly Resin Capacity	Maximum Yearly Catalyst Capacity
	3,345 Tons/Year	40 Tons/Year Note 4,8	6.02 Tons/Year Note 5,8
Flow Diagram Designation	Maximum Hourly Sand Capacity	Maximum Hourly Resin Capacity	Maximum Hourly Catalyst Capacity
PUCB Core Machine #1(Resin+Cat)	0.93 Tons/Hour	22.20 Lbs/Hour Note 4	3.33 Lbs/Hour Note 5
EU39			
Process Description:			
Fritz Winter North America, LP			
PUCB Core Machine #1(Resin+Cat)			
Control Device:	Acid Scrubber (CU07)	Note 6	
SCC Code:			
Control Device Outlet:	gr/dscf		
Airflow:	acfm		
Stack Gas Temperature:	°F		

Facility Process Name:	Criteria Pollutants								
PUCB Core Machine #1(Resin+Cat)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors: lb/ton sand	0.35	0.35	0.35			0.028			
(source)	Note 9	Note 10	Note 10			Note 1,2,3			
Capture Efficiency						100.00			
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	See air pollution control device worksheet for stack emissions					0.624			
Annual (TPY)						**1.128**			
d									
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)						0.624			
Annual (TPY)						**1.128**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ASK Chemicals Vendor Test, June 2025, 30 Mins and After (1.02g-0.17g)/36g)=0.0236 g/g binder, for 1.2% Resin Focus 109/209 system
Note 2: Catalyst usage based on 15% of resin; Catalyst 100% emitted; Acid Scrubber amine control efficiency is 97%; (3.33*(1-0.03))/22.22=0.0045 lb/lb resin
Note 3: Emission Factor - 0.236 + 0.0045 = 0.028; Emissions are on a lb/lb resin basis
Note 4: ASK Chemicals Vendor Test based on 1.2% resin (based on sand); identical maximum rate used by FWNA
Note 5: Maximimum catalyst usage is 15% of resin
Note 6: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)
Note 7: Hourly sand processing rate based on equipment capacity
Note 8: Requested rolling 12-month rolling processing rate
Note 9: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 10: Assumes PM_{10} and $PM_{2.5}$ equivalent to PM

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1(Resin+Cat)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Core Release Capacity
7.7 Tons/Year Note 3

Flow Diagram Designation
PUCB Core Machine #1 (Core Release)
EU39

Maximum Hourly Core Release Capacity
0.0021 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #1 (Core Release)

Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #1 (Core Release)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton						1700.000			
(source)							Note 1,2			
	Capture Efficiency						100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ACMOS 118-63 Core Release (84% VOC by weight per SDS and 1/3/2022 email)
HA NIxStix CB/NB Fast Dry (85% VOC per J. Krause 1/3/2022 email)
Note 2: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)
Note 3: Requested rolling 12-month rolling processing rate

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1 (Core Release)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
135.0 Tons/Year Note 1

Flow Diagram Designation
Core Wash Station #1
EU43

Maximum Hourly Sand Capacity
0.338 Tons/Hour Note 1

Process Description:
Fritz Winter North America, LP
Core Wash Station #1
Control Device: Core/Mold Baghouse (CU08) Note 3
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Core Wash Station #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						0.10%			
(source)							Note 2			
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							0.675			
Annual (TPY)							**0.135**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							0.675			
Annual (TPY)							**0.135**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Usage from original permit application
Note 2: VOC Content of product per supplier (0.1% VOC), Kerntop WV 031 111

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Wash Station #1

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
34.35 MMCF/Year Note 3

Flow Diagram Designation
Core Dryer #1
EU44

Maximum Hourly Capacity
0.004 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Core Dryer #1
Control Device: Core/Mold Baghouse (CU08) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Core Dryer #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1,4	Note 1,4	Note 1,4	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions			0.002	0.392	0.022	0.329	1.96E-06	470.588
	Annual (TPY)					**0.010**	**1.718**	**0.094**	**1.443**	**8.59E-06**	**2061.176**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)					0.002	0.392	0.022	0.329	1.96E-06	470.588
	Annual (TPY)					**0.010**	**1.718**	**0.094**	**1.443**	**8.59E-06**	**2061.176**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 4.0 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Core Dryer #1

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			7.84E-07	3.44E-06	**7.84E-07**	**3.44E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			4.71E-08	2.06E-07	**4.71E-08**	**2.06E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			4.31E-06	1.89E-05	**4.31E-06**	**1.89E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			5.49E-06	2.40E-05	**5.49E-06**	**2.40E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			3.29E-07	1.44E-06	**3.29E-07**	**1.44E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			1.49E-06	6.53E-06	**1.49E-06**	**6.53E-06**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			1.02E-06	4.47E-06	**1.02E-06**	**4.47E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			8.24E-06	3.61E-05	**8.24E-06**	**3.61E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			9.41E-08	4.12E-07	**9.41E-08**	**4.12E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			9.41E-09	4.12E-08	**9.41E-09**	**4.12E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			8.24E-06	3.61E-05	**8.24E-06**	**3.61E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			4.71E-06	2.06E-05	**4.71E-06**	**2.06E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			2.94E-04	1.29E-03	**2.94E-04**	**1.29E-03**	Note 1
Hexane	110-54-3	1.80E+00			7.06E-03	3.09E-02	**7.06E-03**	**3.09E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			2.39E-06	1.05E-05	**2.39E-06**	**1.05E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			1.33E-05	5.84E-05	**1.33E-05**	**5.84E-05**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			9.41E-08	4.12E-07	**9.41E-08**	**4.12E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			6.27E-08	2.75E-07	**6.27E-08**	**2.75E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			1.18E-08	5.15E-08	**1.18E-08**	**5.15E-08**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			1.10E-08	4.81E-08	**1.10E-08**	**4.81E-08**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			6.67E-08	2.92E-07	**6.67E-08**	**2.92E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			1.96E-08	8.59E-08	**1.96E-08**	**8.59E-08**	Note 1,3
Total HAPs					7.40E-03	3.24E-02	**7.40E-03**	**3.24E-02**	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.l)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
34.35 MMCF/Year Note 3

Flow Diagram Designation
Core Dryer #2
EU45

Maximum Hourly Capacity
0.004 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Core Dryer #2
Control Device: Core/Mold Baghouse (CU08) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Core Dryer #2										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1,4	Note 1,4	Note 1,4	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions			0.002	0.392	0.022	0.329	1.96E-06	470.588
	Annual (TPY)					**0.010**	**1.718**	**0.094**	**1.443**	**8.59E-06**	**2061.176**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)					0.002	0.392	0.022	0.329	1.96E-06	470.588
	Annual (TPY)					**0.010**	**1.718**	**0.094**	**1.443**	**8.59E-06**	**2061.176**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 4.0 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: See air pollution control device worksheet for stack emissions

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Core Dryer #2

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			7.84E-07	3.44E-06	**7.84E-07**	**3.44E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			4.71E-08	2.06E-07	**4.71E-08**	**2.06E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			4.31E-06	1.89E-05	**4.31E-06**	**1.89E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			5.49E-06	2.40E-05	**5.49E-06**	**2.40E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			3.29E-07	1.44E-06	**3.29E-07**	**1.44E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			1.49E-06	6.53E-06	**1.49E-06**	**6.53E-06**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			1.02E-06	4.47E-06	**1.02E-06**	**4.47E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			8.24E-06	3.61E-05	**8.24E-06**	**3.61E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			9.41E-08	4.12E-07	**9.41E-08**	**4.12E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			9.41E-09	4.12E-08	**9.41E-09**	**4.12E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			8.24E-06	3.61E-05	**8.24E-06**	**3.61E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			4.71E-06	2.06E-05	**4.71E-06**	**2.06E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			2.94E-04	1.29E-03	**2.94E-04**	**1.29E-03**	Note 1
Hexane	110-54-3	1.80E+00			7.06E-03	3.09E-02	**7.06E-03**	**3.09E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			2.39E-06	1.05E-05	**2.39E-06**	**1.05E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			1.33E-05	5.84E-05	**1.33E-05**	**5.84E-05**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			9.41E-08	4.12E-07	**9.41E-08**	**4.12E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			6.27E-08	2.75E-07	**6.27E-08**	**2.75E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			1.18E-08	5.15E-08	**1.18E-08**	**5.15E-08**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			1.10E-08	4.81E-08	**1.10E-08**	**4.81E-08**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			6.67E-08	2.92E-07	**6.67E-08**	**2.92E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			1.96E-08	8.59E-08	**1.96E-08**	**8.59E-08**	Note 1,3
Total HAPs					7.40E-03	3.24E-02	**7.40E-03**	**3.24E-02**	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.l)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 8

Flow Diagram Designation
Pouring #1
EU50

Maximum Hourly Capacity
15.00 Tons/Hour Note 7

Process Description:
Fritz Winter North America, LP
Pouring #1
Control Device: Core/Mold Baghouse (CU08) Note 6
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Pouring #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.410	0.410	0.336	0.020	0.010	3.540	6.166	4.79E-04	
(source)			Note 1	Note 1	Note 5	Note 2	Note 2	Note 4	Note 4	Note 3	
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions			0.300	0.150	53.101	92.488	7.19E-03	
	Annual (TPY)					**0.800**	**0.400**	**141.604**	**246.634**	**1.92E-02**	
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)					0.300	0.150	53.101	92.488	7.19E-03	
	Annual (TPY)					**0.800**	**0.400**	**141.604**	**246.634**	**1.92E-02**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Stack test at Quality Castings, Orrville, OH.
Note 2: WebFIRE (Aug 20, 2021) SCC 30400320
Note 3: Emission factors taken from the document entitled "Foundry Process Emission Factors: Baseline Emissions from Automotive Foundries in Mexico"; (CERP-Mexico); Table 5.12
Note 4: Based on upper 95th% Confidence Interval of 2019 and 2024 CU08/ST09 stack test results; considering other units vented to this stack
Note 5: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 6: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 7: Hourly equipment capacity
Note 8: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (E
Maximum Stack Emissions Rate (lb/hr) {SOx,NOx, VOC, CO} =(Max. Rated Capa
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of ope
Maximum Annual (ton/yr) SOx NOx, VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 4

Flow Diagram Designation
Mold Cooling
EU52

Maximum Hourly Capacity
15.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Mold Cooling

Control Device: Core/Mold Baghouse (CU08) Note 2
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Mold Cooling										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton									
(source)		Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
Capture Efficiency		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emissions are combined with pouring. See Pouring #1 (EU50) worksheet.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Hourly equipment capacity
Note 4: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (E
Maximum Stack Emissions Rate (lb/hr) {SOx,NOx, VOC, CO} =(Max. Rated Capa
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of ope
Maximum Annual (ton/yr) SOx NOx, VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Cooling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 5

Flow Diagram Designation
Shakeout Conveyor
EU53

Maximum Hourly Capacity
15.00 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Shakeout Conveyor
Control Device: Sand Plant Baghouse (CU06) Note 3
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Shakeout Conveyor										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	3.20	2.24	1.34			0.616	0.515		
(source)			Note 1	Note 1	Note 1			Note 2	Note 2		
		Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions					9.240	7.725		
	Annual (TPY)							**24.640**	**20.600**		
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)							9.240	7.725		
	Annual (TPY)							**24.640**	**20.600**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: WebFire SCC 30400318 (4/15/2021)
Note 2: Based on upper 95th% Confidence Interval of 2018, 2020 and 2024 CU06/ST07 stack test results; considering other units vented to this stack
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 4: Hourly equipment capacity
Note 5: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Shakeout Conveyor

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year

Flow Diagram Designation
Pouring Cooling Shakeout HAPs (Mold)
HAPs

Maximum Hourly Capacity
15.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Pouring Cooling Shakeout HAPs (Mold)
Control Device: CU06 and CU08
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Pouring Cooling Shakeout HAPs (Mold)										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton									
(source)			Note 1,2								
		Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: See below for organic HAP emissions from pouring, cooling and shakeout
Note 2: Inorganic HAPs are quantified on the air pollution control device worksheet for CU06 and CU08

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring Cooling Shakeout HAPs (Mold)

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0	0.0045			0.0674	0.1797	**0.0674**	**0.1797**	Note 3
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								Note 3
Anthracene (POM)	120-12-7								
Benzene	71-43-2	0.0728			1.0918	2.9114	**1.0918**	**2.9114**	Note 3
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.0050			0.0747	0.1993	**0.0747**	**0.1993**	Note 3
Formaldehyde	50-00-0								Note 3
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								Note 3
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.0411			0.6164	1.6436	**0.6164**	**1.6436**	Note 3
Xylenes	1330-20-7	0.0303			0.4546	1.2123	**0.4546**	**1.2123**	Note 3,4
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs				2.3049	6.1464	2.3049	6.1464	

Note 3: CERP/Technikon Report 1256-1311DQ for organic HAPs associated with green sand mold, Table 3-1
6 mold average adjusted for LOI (4.06 FWNA; 4.97 DQ Test)
Note 4: Xylene CAS number is used for mixture of isomers

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80 Tons/Year

Flow Diagram Designation
Pouring Cooling Shakeout HAPs (Core)
HAPs

Maximum Hourly Capacity
0.02 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Pouring Cooling Shakeout HAPs (Core)
Control Device: CU06 and CU08
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			Criteria Pollutants								
	Pouring Cooling Shakeout HAPs (Core)										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/lb									
(source)			Note 1,2								
		Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: See below for organic HAP emissions from pouring, cooling and shakeout attributed to core
Note 2: Inorganic HAPs are quantified on the air pollution control device worksheet for CU06 and CU08
Note 3: Based on maximum % resin of 1.2% based on sand (BOS)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring Cooling Shakeout HAPs (Core)

HAPs	CAS No.	Emission Factor lb/lb	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2	0.0084			0.3768	0.6776	**0.3768**	**0.6776**	Note 4
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.0001			0.0027	0.0048	**0.0027**	**0.0048**	Note 4
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0022			0.1000	0.1798	**0.1000**	**0.1798**	Note 4
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0189			0.8428	1.5157	**0.8428**	**1.5157**	Note 4
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.0012			0.0527	0.0947	**0.0527**	**0.0947**	Note 4
Xylenes	1330-20-7	0.0003			0.0152	0.0273	**0.0152**	**0.0273**	Note 4
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs				1.3901	2.4999	1.3901	2.4999	

Note 4: Supplier emissions incormation for PUCB ASK Focus I/II

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,323 Tons/Year Note 4

Flow Diagram Designation
Sand Plant Waste Sand Silo
EU57

Maximum Hourly Capacity
0.38 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Sand Plant Waste Sand Silo
Control Device: Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Sand Plant Waste Sand Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on mass balance of dust from serviced fabric filters
Note 4: Annual based on hourly times 8,760 hours per year

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Sand Plant Waste Sand Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 4

Flow Diagram Designation
Casting Cooling
EU59

Maximum Hourly Capacity
15.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Casting Cooling
Control Device: Core/Mold Baghouse (CU08) Note 2
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Casting Cooling										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.03	0.02	0.01						
(source)			Note 1	Note 1	Note 1						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: 1.0% of emission factor from FIRE 6.25 SCC 3-04-003-31
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Hourly equipment capacity
Note 4: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Casting Cooling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 4

Flow Diagram Designation
Sorting Conveyor
EU60

Maximum Hourly Capacity
15.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Sorting Conveyor
Control Device: Fettling Baghouse (CU11) Note 2
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Sorting Conveyor										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.02	0.01	0.01						
(source)			Note 1	Note 1	Note 1						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: 0.5% of emission factor from FIRE 6.25 SCC 3-04-003-31
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Hourly equipment capacity
Note 4: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Sorting Conveyor

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 6

Flow Diagram Designation
Steel Shot Blasting #1
EU61

Maximum Hourly Capacity
15.00 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Steel Shot Blasting #1
Control Device: Fettling Baghouse (CU11) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Steel Shot Blasting #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	15.50	1.70	1.70						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-40
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Steel Shot Blasting #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,323 Tons/Year Note 4

Flow Diagram Designation
Fettling Baghouse Waste Dust Silo
EU63

Maximum Hourly Capacity
0.38 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Fettling Baghouse Waste Dust Silo
Control Device: Fettling BH Waste Dust Silo Bin Vent Filter (CU12)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		Criteria Pollutants								
	Fettling Baghouse Waste Dust Silo									
Emission Factor Basis:		PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on mass balance of dust from serviced fabric filters
Note 4: Annual based on hourly times 8,760 hours per year

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Fettling Baghouse Waste Dust Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 6

Flow Diagram Designation
Auto Grinding #1
EU64

Maximum Hourly Capacity
7.50 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Auto Grinding #1
Control Device: Fettling Baghouse (CU11) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Auto Grinding #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Auto Grinding #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 6

Flow Diagram Designation
Auto Grinding #1
EU64

Maximum Hourly Capacity
7.50 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Auto Grinding #1
Control Device: Fettling Baghouse (CU11) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Auto Grinding #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Auto Grinding #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 6

Flow Diagram Designation
Machining Lines (9)
EU66

Maximum Hourly Capacity
7.50 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Machining Lines (9)
Control Device: Machining Cartridge Collectors (CU13a-h) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Machining Lines (9)										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions								
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Machining Lines (9)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 6

Flow Diagram Designation
Perforation Line #2
EU67

Maximum Hourly Capacity
7.50 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Perforation Line #2
Control Device: Performance Line #2 Cartridge Colle Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Perforation Line #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Perforation Line #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
36.00 Tons/Year Note 5

Flow Diagram Designation
Paint Line #3 (Coating)
EU68

Maximum Hourly Capacity
9.00 Lbs/Hour Note 4

Process Description:
Fritz Winter North America, LP
Paint Line #3 (Coating)
Control Device: Paint Line #3 Booth Filter (CU14)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #3 (Coating)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.87	0.87	0.87			0.270			
(source)		Note 1	Note 2	Note 2			Note 6			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency										
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions					2.430			
Annual (TPY)							**9.720**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							2.430			
Annual (TPY)							**9.720**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Zinc Dust Primer EDS (INMOTIQ Primer SB 1K) (density is 25.75 lb/gal)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM
Note 3: See air pollution control device worksheet for particulate TAC emissions
Note 4: Hourly equipment capacity
Note 5: Requested maximum material processed per year per rolling 12-month basis
Note 6: 95th percentile confidence interval of highest Line 2 and 3 performance test

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #3 (Coating)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2	0.010%			9.00E-04	3.60E-03	**9.00E-04**	**3.60E-03**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8	0.060%			5.40E-03	2.16E-02	**5.40E-03**	**2.16E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.950%			8.55E-02	3.42E-01	**8.55E-02**	**3.42E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.020%			1.80E-03	7.20E-03	**1.80E-03**	**7.20E-03**	Note 1
Xylenes	1330-20-7	3.890%			3.50E-01	1.40E+00	**3.50E-01**	**1.40E+00**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
Total HAPs					4.44E-01	1.77E+00	4.44E-01	1.77E+00	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #3 (Coating)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6	1.81%			1.63E-01	6.52E-01	**1.63E-01**	**6.52E-01**	Note 1
Zinc (TAC)	7440-66-6								Note 3
Zinc Oxide (TAC)	1314-13-2								Note 3
n-Butyl Acetate (TAC)	123-86-4								
Solvent Naphtha (TAC)	64742-95-6								
1-Butanol (TAC)	71-36-3								
Mesitylene (TAC)	108-67-6								
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								
Other Air Toxics									

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
4.00 Tons/Year Note 4

Flow Diagram Designation
Paint Line #3 (Thinner)
EU68

Maximum Hourly Capacity
1.00 Lbs/Hour Note 3

Process Description:
Fritz Winter North America, LP
Paint Line #3 (Thinner)
Control Device: Paint Line #3 Booth Filter (CU14)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #3 (Thinner)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb						1.00			
(source)							Note 1			
Capture Efficiency							100.00			
Control Efficiency										
Transfer Efficiency										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							1.000			
Annual (TPY)							**4.000**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							1.000			
Annual (TPY)							**4.000**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Reducing Solvent Blend for WG102992 TDS (Thinner Density is 7.26 lb/gal)
Note 2: See air pollution control device worksheet for TAC emissions
Note 3: Hourly equipment capacity
Note 4: Requested maximum material processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #3 (Thinner)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8	0.54%			5.37E-03	2.15E-02	**5.37E-03**	**2.15E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	3.30%			3.30E-02	1.32E-01	**3.30E-02**	**1.32E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7	6.19%			6.19E-02	2.48E-01	**6.19E-02**	**2.48E-01**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
Total HAPs					1.00E-01	4.01E-01	1.00E-01	4.01E-01	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #3 (Thinner)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6								
Zinc (TAC)	7440-66-6								
Zinc Oxide (TAC)	1314-13-2								
n-Butyl Acetate (TAC)	123-86-4	51.59%			5.16E-01	2.06E+00	**5.16E-01**	**2.06E+00**	Note 1
Solvent Naphtha (TAC)	64742-95-6	14.44%			1.44E-01	5.78E-01	**1.44E-01**	**5.78E-01**	Note 1
1-Butanol (TAC)	71-36-3	6.19%			6.19E-02	2.48E-01	**6.19E-02**	**2.48E-01**	Note 1
Mesitylene (TAC)	108-67-6	3.30%			3.30E-02	1.32E-01	**3.30E-02**	**1.32E-01**	Note 1
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
36.00 Tons/Year Note 5

Flow Diagram Designation
Paint Line #2(Coating)
EU69

Maximum Hourly Capacity
9.00 Lbs/Hour Note 4

Process Description:
Fritz Winter North America, LP
Paint Line #2(Coating)
Control Device: Paint Line #2 Booth Filter (CU15)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Paint Line #2(Coating)										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.87	0.87	0.87			0.27			
(source)		Note 1	Note 2	Note 2			Note 6			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency										
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions					2.430			
Annual (TPY)							**9.720**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							2.430			
Annual (TPY)							**9.720**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Zinc Dust Primer EDS (INMOTIQ Primer SB 1K) (density is 25.75 lb/gal)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM
Note 3: See air pollution control device worksheet for TAC emissions
Note 4: Hourly equipment capacity
Note 5: Requested maximum material processed per year per rolling 12-month basis
Note 6: 95th percentile confidence interval of highest Line 2 and 3 performance test

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #2(Coating)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2	0.010%			9.00E-04	3.60E-03	**9.00E-04**	**3.60E-03**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8	0.060%			5.40E-03	2.16E-02	**5.40E-03**	**2.16E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.950%			8.55E-02	3.42E-01	**8.55E-02**	**3.42E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.020%			1.80E-03	7.20E-03	**1.80E-03**	**7.20E-03**	Note 1
Xylenes	1330-20-7	3.890%			3.50E-01	1.40E+00	**3.50E-01**	**1.40E+00**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
Total HAPs					4.44E-01	1.77E+00	4.44E-01	1.77E+00	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #2(Coating)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6	1.81%			1.63E-01	6.52E-01	**1.63E-01**	**6.52E-01**	Note 1
Zinc (TAC)	7440-66-6								Note 3
Zinc Oxide (TAC)	1314-13-2								Note 3
n-Butyl Acetate (TAC)	123-86-4								
Solvent Naphtha (TAC)	64742-95-6								
1-Butanol (TAC)	71-36-3								
Mesitylene (TAC)	108-67-6								
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
4.00 Tons/Year Note 4

Flow Diagram Designation
Paint Line #2(Thinner)
EU69

Maximum Hourly Capacity
1.00 Lbs/Hour Note 3

Process Description:
Fritz Winter North America, LP
Paint Line #2(Thinner)
Control Device: Paint Line #2 Booth Filter (CU15)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #2(Thinner)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb						1.00			
(source)							Note 1			
Capture Efficiency							100.00			
Control Efficiency										
Transfer Efficiency										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							1.000			
Annual (TPY)							**4.000**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							1.000			
Annual (TPY)							**4.000**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Reducing Solvent Blend for WG102992 TDS (Thinner Density is 7.26 lb/gal)
Note 2: See air pollution control device worksheet for TAC emissions

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #2(Thinner)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8	0.537%			5.37E-03	2.15E-02	**5.37E-03**	**2.15E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	3.302%			3.30E-02	1.32E-01	**3.30E-02**	**1.32E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7	6.191%			6.19E-02	2.48E-01	**6.19E-02**	**2.48E-01**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
Total HAPs					1.00E-01	4.01E-01	1.00E-01	4.01E-01	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #2(Thinner)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6								
Zinc (TAC)	7440-66-6								
Zinc Oxide (TAC)	1314-13-2								
n-Butyl Acetate (TAC)	123-86-4	51.59%			5.16E-01	2.06E+00	**5.16E-01**	**2.06E+00**	Note 1
Solvent Naphtha (TAC)	64742-95-6	14.44%			1.44E-01	5.78E-01	**1.44E-01**	**5.78E-01**	Note 1
1-Butanol (TAC)	71-36-3	6.19%			6.19E-02	2.48E-01	**6.19E-02**	**2.48E-01**	Note 1
Mesitylene (TAC)	108-67-6	3.30%			3.30E-02	1.32E-01	**3.30E-02**	**1.32E-01**	Note 1
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								
Other Air Toxics									

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
10.00 Tons/Year Note 7

Flow Diagram Designation
Paint Line #1
EU71

Maximum Hourly Capacity
5.50 Lbs/Hour Note 6

Process Description:
Fritz Winter North America, LP
Paint Line #1
Control Device: Paint Line #1 Booth Filter (CU17)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Paint Line #1										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.41	0.41	0.41			0.180			
(source)		Note 1	Note 2	Note 2			Note 3			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency										
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)		See air pollution control device worksheet for stack emissions					0.992			
Annual (TPY)							**1.804**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							0.992			
Annual (TPY)							**1.804**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Geomet 360 SDS (upper end of % solids range)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM
Note 3: 95th CI of 2018 and 2024 compliance tests (Geomet 360 Air Quality Data Sheet 1.6 lb/gal VOC at coating density of 11.05 lbs/gal or 0.14 lb/lb coating)
Note 4: Above quantities and emission factors disregard DI water that is used as a thinner
Note 5: See air pollution control device worksheet for TAC emissions
Note 6: Hourly equipment capacity
Note 7: Requested maximum material processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1	3.40%			1.87E-01	3.40E-01	**1.87E-01**	**3.40E-01**	Note 3
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs				1.87E-01	3.40E-01	1.87E-01	3.40E-01	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #1

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6								
Zinc (TAC)	7440-66-6								
Zinc Oxide (TAC)	1314-13-2								
n-Butyl Acetate (TAC)	123-86-4								
Solvent Naphtha (TAC)	64742-95-6								
1-Butanol (TAC)	71-36-3								
Mesitylene (TAC)	108-67-6								
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8	1.00%			5.50E-02	1.00E-01	**5.50E-02**	**1.00E-01**	Note 5
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9	1.00%			5.50E-02	1.00E-01	**5.50E-02**	**1.00E-01**	Note 5

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
735.00 MMBtu/Year Note 4

Flow Diagram Designation
Emergency Generator #1
EU72

Maximum Hourly Capacity
7.350 MMBtu/Hour Note 3

Process Description:
McWane Plant & Industrial - Calera, AL
Emergency Generator #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Emergency Generator #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/MMBtu		0.07	0.07	0.07	1.52	3.20	0.09	0.85		165.00
(source)			Note 1,4	Note 1,4	Note 1,4	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency									
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)		5.12E-01	5.12E-01	5.12E-01	1.11E+01	2.35E+01	6.62E-01	6.25E+00		1.21E+03
	Annual (TPY)		**2.56E-02**	**2.56E-02**	**2.56E-02**	**5.57E-01**	**1.18E+00**	**3.31E-02**	**3.12E-01**		**6.06E+01**
Total Emission Rate:											
	Hourly (lb/hr)		5.12E-01	5.12E-01	5.12E-01	1.11E+01	2.35E+01	6.62E-01	6.25E+00		1.21E+03
	Annual (TPY)		**2.56E-02**	**2.56E-02**	**2.56E-02**	**5.57E-01**	**1.18E+00**	**3.31E-02**	**3.12E-01**		**6.06E+01**

POTENTIAL OPERATING SCHEDULE
2 HRS/DAY
100 HRS/YEAR

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: Maximum hourly 1050 HP; 7,000 Btu/hp-hr (AP-42 Table 3.3-1, footnote e)
Note 4: Maximum Hourly times potential operating hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Emergency Generator #1

HAP/TRI	CAS No.	Emission Factor (lb/10^6 scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	4.68E-06	3.44E-05	1.72E-06			**3.44E-05**	**1.72E-06**	Note 1,3
Acenaphthylene (POM)	208-96-8	9.23E-06	6.78E-05	3.39E-06			**6.78E-05**	**3.39E-06**	Note 1,3
Acetaldehyde	75-07-0	2.52E-05	1.85E-04	9.26E-06			**1.85E-04**	**9.26E-06**	Note 1
Acetophenone	98-86-2								
Acrolein	107-02-8	7.88E-06	5.79E-05	2.90E-06			**5.79E-05**	**2.90E-06**	Note 1,2
Aniline	62-53-3								
Anthracene (POM)	120-12-7	1.23E-06	9.04E-06	4.52E-07			**9.04E-06**	**4.52E-07**	Note 1,3
Benzene	71-43-2	7.76E-04	5.70E-03	2.85E-04			**5.70E-03**	**2.85E-04**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.89E-05	5.80E-04	2.90E-05			**5.80E-04**	**2.90E-05**	Note 1
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	1.30E-04	9.56E-04	4.78E-05			**9.56E-04**	**4.78E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	2.81E-04	2.07E-03	1.03E-04			**2.07E-03**	**1.03E-04**	Note 1
Xylenes	1330-20-7	1.93E-04	1.42E-03	7.09E-05			**1.42E-03**	**7.09E-05**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3	6.22E-07	4.57E-06	2.29E-07			**4.57E-06**	**2.29E-07**	Note 1,3
Benzo(a)pyrene (POM)	50-32-8	2.57E-07	1.89E-06	9.44E-08			**1.89E-06**	**9.44E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.11E-06	8.16E-06	4.08E-07			**8.16E-06**	**4.08E-07**	Note 1,3
Benzo(g,h,i)perylene (POM)	191-24-2	5.56E-07	4.09E-06	2.04E-07			**4.09E-06**	**2.04E-07**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	2.18E-07	1.60E-06	8.01E-08			**1.60E-06**	**8.01E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.53E-06	1.12E-05	5.62E-07			**1.12E-05**	**5.62E-07**	Note 1,3
Dibenzo(a,h)anthracene (POM)	53-70-3	3.46E-07	2.54E-06	1.27E-07			**2.54E-06**	**1.27E-07**	Note 1,2,3
Fluoranthene (POM)	206-44-0	4.03E-06	2.96E-05	1.48E-06			**2.96E-05**	**1.48E-06**	Note 1,3
Fluorene (POM)	86-73-7	1.28E-05	9.41E-05	4.70E-06			**9.41E-05**	**4.70E-06**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	4.14E-07	3.04E-06	1.52E-07			**3.04E-06**	**1.52E-07**	Note 1,2,3
Phenanathrene (POM)	85-01-8	4.08E-05	3.00E-04	1.50E-05			**3.00E-04**	**1.50E-05**	Note 1,3
Pyrene (POM)	129-00-0	3.71E-06	2.73E-05	1.36E-06			**2.73E-05**	**1.36E-06**	Note 1,3
	Total HAPs		1.16E-02	5.78E-04			**1.16E-02**	**5.78E-04**	

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
735.00 MMBtu/Year Note 4

Flow Diagram Designation
Emergency Generator #2
EU73

Maximum Hourly Capacity
7.350 MMBtu/Hour Note 3

Process Description:
McWane Plant & Industrial - Calera, AL
Emergency Generator #2
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Emergency Generator #2										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/MMBtu	0.07	0.07	0.07	1.52	3.20	0.09	0.85		165.00
(source)			Note 1,4	Note 1,4	Note 1,4	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency									
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)		5.12E-01	5.12E-01	5.12E-01	1.12E+01	2.35E+01	6.62E-01	6.25E+00		1.21E+03
	Annual (TPY)		**2.56E-02**	**2.56E-02**	**2.56E-02**	**5.59E-01**	**1.18E+00**	**3.31E-02**	**3.12E-01**		**6.06E+01**
Total Emission Rate:											
	Hourly (lb/hr)		5.12E-01	5.12E-01	5.12E-01	1.12E+01	2.35E+01	6.62E-01	6.25E+00		1.21E+03
	Annual (TPY)		**2.56E-02**	**2.56E-02**	**2.56E-02**	**5.59E-01**	**1.18E+00**	**3.31E-02**	**3.12E-01**		**6.06E+01**

POTENTIAL OPERATING SCHEDULE
2 HRS/DAY
100 HRS/YEAR

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: Maximum hourly 1050 HP; 7,000 Btu/hp-hr (AP-42 Table 3.3-1, footnote e)
Note 4: Maximum Hourly times potential operating hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Emergency Generator #2

HAP/TRI	CAS No.	Emission Factor (lb/10^6 scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	4.68E-06	3.44E-05	1.72E-06			**3.44E-05**	**1.72E-06**	Note 1,3
Acenaphthylene (POM)	208-96-8	9.23E-06	6.78E-05	3.39E-06			**6.78E-05**	**3.39E-06**	Note 1,3
Acetaldehyde	75-07-0	2.52E-05	1.85E-04	9.26E-06			**1.85E-04**	**9.26E-06**	Note 1
Acetophenone	98-86-2								
Acrolein	107-02-8	7.88E-06	5.79E-05	2.90E-06			**5.79E-05**	**2.90E-06**	Note 1,2
Aniline	62-53-3								
Anthracene (POM)	120-12-7	1.23E-06	9.04E-06	4.52E-07			**9.04E-06**	**4.52E-07**	Note 1,3
Benzene	71-43-2	7.76E-04	5.70E-03	2.85E-04			**5.70E-03**	**2.85E-04**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.89E-05	5.80E-04	2.90E-05			**5.80E-04**	**2.90E-05**	Note 1
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	1.30E-04	9.56E-04	4.78E-05			**9.56E-04**	**4.78E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	2.81E-04	2.07E-03	1.03E-04			**2.07E-03**	**1.03E-04**	Note 1
Xylenes	1330-20-7	1.93E-04	1.42E-03	7.09E-05			**1.42E-03**	**7.09E-05**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3	6.22E-07	4.57E-06	2.29E-07			**4.57E-06**	**2.29E-07**	Note 1,3
Benzo(a)pyrene (POM)	50-32-8	2.57E-07	1.89E-06	9.44E-08			**1.89E-06**	**9.44E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.11E-06	8.16E-06	4.08E-07			**8.16E-06**	**4.08E-07**	Note 1,3
Benzo(g,h,i)perylene (POM)	191-24-2	5.56E-07	4.09E-06	2.04E-07			**4.09E-06**	**2.04E-07**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	2.18E-07	1.60E-06	8.01E-08			**1.60E-06**	**8.01E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.53E-06	1.12E-05	5.62E-07			**1.12E-05**	**5.62E-07**	Note 1,3
Dibenzo(a,h)anthracene (POM)	53-70-3	3.46E-07	2.54E-06	1.27E-07			**2.54E-06**	**1.27E-07**	Note 1,2,3
Fluoranthene (POM)	206-44-0	4.03E-06	2.96E-05	1.48E-06			**2.96E-05**	**1.48E-06**	Note 1,3
Fluorene (POM)	86-73-7	1.28E-05	9.41E-05	4.70E-06			**9.41E-05**	**4.70E-06**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	4.14E-07	3.04E-06	1.52E-07			**3.04E-06**	**1.52E-07**	Note 1,2,3
Phenanathrene (POM)	85-01-8	4.08E-05	3.00E-04	1.50E-05			**3.00E-04**	**1.50E-05**	Note 1,3
Pyrene (POM)	129-00-0	3.71E-06	2.73E-05	1.36E-06			**2.73E-05**	**1.36E-06**	Note 1,3
	Total HAPs		1.16E-02	5.78E-04			**1.16E-02**	**5.78E-04**	

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
39.20 MMBtu/Year Note 4

Flow Diagram Designation
Emergency Generator #3
EU74

Maximum Hourly Capacity
0.392 MMBtu/Hour Note 3

Process Description:
McWane Plant & Industrial - Calera, AL
Emergency Generator #3
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Emergency Generator #3										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/MMBtu	0.31	0.31	0.31	0.29	4.41	0.35	0.95		164.00
(source)			Note 1,4	Note 1,4	Note 1,4	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency									
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)		1.22E-01	1.22E-01	1.22E-01	1.14E-01	1.73E+00	1.37E-01	3.72E-01		6.43E+01
	Annual (TPY)		**6.08E-03**	**6.08E-03**	**6.08E-03**	**5.68E-03**	**8.64E-02**	**6.86E-03**	**1.86E-02**		**3.21E+00**
Total Emission Rate:											
	Hourly (lb/hr)		1.22E-01	1.22E-01	1.22E-01	1.14E-01	1.73E+00	1.37E-01	3.72E-01		6.43E+01
	Annual (TPY)		**6.08E-03**	**6.08E-03**	**6.08E-03**	**5.68E-03**	**8.64E-02**	**6.86E-03**	**1.86E-02**		**3.21E+00**

POTENTIAL OPERATING SCHEDULE
2 HRS/DAY
100 HRS/YEAR

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: Maximum hourly 56 HP; 7000.0 Btu/hp-hr (AP-42 Table 3.3-1, footnote e)
Note 4: Maximum Hourly times potential operating hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Emergency Generator #3

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0	3.91E-05	1.53E-05	7.66E-07			**1.53E-05**	**7.66E-07**	
Acenaphthene (POM)	83-32-9	1.42E-06	5.57E-07	2.78E-08			**5.57E-07**	**2.78E-08**	Note 1,3
Acenaphthylene (POM)	208-96-8	5.06E-06	1.98E-06	9.92E-08			**1.98E-06**	**9.92E-08**	Note 1,3
Acetaldehyde	75-07-0	7.67E-04	3.01E-04	1.50E-05			**3.01E-04**	**1.50E-05**	Note 1
Acetophenone	98-86-2								
Acrolein	107-02-8	9.25E-05	3.63E-05	1.81E-06			**3.63E-05**	**1.81E-06**	Note 1,2
Aniline	62-53-3								
Anthracene (POM)	120-12-7	1.87E-06	7.33E-07	3.67E-08			**7.33E-07**	**3.67E-08**	Note 1,3
Benzene	71-43-2	9.33E-04	3.66E-04	1.83E-05			**3.66E-04**	**1.83E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	1.18E-03	4.63E-04	2.31E-05			**4.63E-04**	**2.31E-05**	Note 1
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	8.48E-05	3.32E-05	1.66E-06			**3.32E-05**	**1.66E-06**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	4.09E-04	1.60E-04	8.02E-06			**1.60E-04**	**8.02E-06**	Note 1
Xylenes	1330-20-7	2.85E-04	1.12E-04	5.59E-06			**1.12E-04**	**5.59E-06**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3	1.68E-06	6.59E-07	3.29E-08			**6.59E-07**	**3.29E-08**	Note 1,3
Benzo(a)pyrene (POM)	50-32-8	1.88E-07	7.37E-08	3.68E-09			**7.37E-08**	**3.68E-09**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	9.91E-08	3.88E-08	1.94E-09			**3.88E-08**	**1.94E-09**	Note 1,3
Benzo(g,h,i)perylene (POM)	191-24-2	4.89E-07	1.92E-07	9.58E-09			**1.92E-07**	**9.58E-09**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.55E-07	6.08E-08	3.04E-09			**6.08E-08**	**3.04E-09**	Note 1,2,3
Chrysene (POM)	218-01-9	3.53E-07	1.38E-07	6.92E-09			**1.38E-07**	**6.92E-09**	Note 1,3
Dibenzo(a,h)anthracene (POM)	53-70-3	5.83E-07	2.29E-07	1.14E-08			**2.29E-07**	**1.14E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	7.61E-06	2.98E-06	1.49E-07			**2.98E-06**	**1.49E-07**	Note 1,3
Fluorene (POM)	86-73-7	2.92E-05	1.14E-05	5.72E-07			**1.14E-05**	**5.72E-07**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	3.75E-07	1.47E-07	7.35E-09			**1.47E-07**	**7.35E-09**	Note 1,2,3
Phenanathrene (POM)	85-01-8	2.94E-05	1.15E-05	5.76E-07			**1.15E-05**	**5.76E-07**	Note 1,3
Pyrene (POM)	129-00-0	4.78E-06	1.87E-06	9.37E-08			**1.87E-06**	**9.37E-08**	Note 1,3
	Total HAPs		1.52E-03	7.59E-05			**1.52E-03**	**7.59E-05**	

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Tank No.	Diesel Storage Tank (1000 gallon)	**Tank type**	Horizontal	**Date**		08/21/25	
Material stored	Fuel Oil No. 2 (Diesel)	**Company**	Fritz Winter North America	**Performed by**		Craig Schmeisser	
City	Franklin	**State**	KY			Mad River Strategies, LLC	
Description	Diesel Storage Tank (1000 gallon)						

INPUT DATA					CALCULATIONS				
	Reference	**Symbol**	**Values**	**Units**		**Reference**	**Symbol**		**Units**
					Breathing losses				
Molecular Weight					Tank vapor space volume	AP-42, Section 7.1, pg 7.1-16, Eq. 1-3	V_V	136.92	ft^3
Molecular weight	AP-42, Section 7.1, Table 7.1-2, pg 7.1-92	M_V	130	Lb/lb-mole	Vapor density	AP-42, Section 7.1, pg 7.1-23, Eq. 1-22	W_V	1.591E-04	lb/ft^3
Tank design data					Vapor space expansion factor	AP-42, Section 7.1, pg 7.1-20, Eq. 1-12	K_E	0.03212	Dimensionless
Shell height	See Horizontal Tank Calcs Below - Calculated	H or H_E	4.42	ft	Vented vapor saturation factor	AP-42, Section 7.1, pg 7.1-22, Eq. 1-21	K_S	0.9992	Dimensionless
Diameter	See Horizontal Tank Calcs Below - Calculated	D or D_E	8.88	ft					
Maximum liquid height	AP-42, Section 7.1, pg 7.1-28	H_{LX}	4.42	ft	**Standing Storage Loss (Breathing Loss)**	AP-42, Section 7.1, pg 7.1-16, Eq. 1-2	L_S	0.2551	lb/yr
Minimum liquid height	AP-42, Section 7.1, pg 7.1-28	H_{LN}	0.00	ft					
Vapor Space Outage	AP-42, Section 7.1, pg 7.1-21	H_{VO}	2.21	ft	**Working losses**	AP-42, Section 7.1, pg 7.1-28, Eq. 1-35	L_W	137.3876	lb/yr
Annual Sum of the increases in liquid level	AP-42, Section 7.1, pg 7.1-28, Eq. 1-37	$\sum H_{OI}$	69.07	ft/yr					
Tank Maximum Liquid Volume	AP-42, Section 7.1, pg 7.1-201, Eq. 60-4	V_{LX}	274	ft^3					
Turnovers	AP-42, Section 7.1, pg 7.1-28	N	16	Dimensionless	**TOTAL LOSSES**	Calculated	L_T	**137.6427**	lb/yr
Net throughput	Calculated @ 31.5 gals/bbl	Q	762	bbl/yr					
Turnover factor	AP-42, Section 7.1, pg 7.1-28	K_N	1.00	Dimensionless					
Working loss product factor	AP-42, Section 7.1, pg 7.1-28	K_P	1.00	Dimensionless					
Net working loss throughput	AP-42, Section 7.1, pg 7.1-29, Eq. 1-38	V_Q	4277.33	bb/yr					
Meteorological data									
Daily ave. ambient temp.	AP-42, Section 7.1, pg 7.1-26, Eq. 1-30	T_{AA}	519.85	°R					
Daily max. ambient temp.	AP-42, Section 7.1, Table 7.1-7, pg 7.1-132 Nashville, TN as location	T_{AX}	529.40	°R					
Daily min. ambient temp.	AP-42, Section 7.1, Table 7.1-7, pg 7.1-63 Nashville, TN as location	T_{AN}	510.30	°R					
Daily ambient temp. range	AP-42, Section 7.1, pg 7.1-19, Eq. 1-11	ΔT_A	19.10	°R					
Tank paint solar absorptance	AP-42, Section 7.1, Table 7.1-6, pg 7.1-102 White Tank	a	0.17	Dimensionless					
Daily total insolation factor	AP-42, Section 7.1, Table 7.1-7, pg 7.1-63 Nashville, TN as location	I	1,316	Btu/ft^2-day					
Liquid bulk temperature	AP-42, Section 7.1, pg 7.1-27, Eq. 1-31	T_B	520.52	°R					
Daily vapor temp. range	AP-42, Section 7.1, pg 7.1-18, Eq. 1-7	ΔT_V	17.84	°R					
Daily ave. liquid surface temp.	AP-42, Section 7.1, pg 7.1-26, Eq. 1-28	T_{LA}	521.37	°R					
Daily max. liquid surface temp.	AP-42, Section 7.1, pg 7.1-83, Fig. 7.1-17	T_{LX}	525.83	°R					
Daily min. liquid surface temp.	AP-42, Section 7.1, pg 7.1-83, Fig. 7.1-17	T_{LN}	516.91	°R					
Average vapor temperature	AP-42, Section 7.1, pg 7.1-27, Eq. 1-33	T_v	522.06	°R					
VP @ daily ave. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VA}	0.0069	psi					
VP @ daily max. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VX}	0.0079	psi					
VP @ daily min. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VN}	0.0059	psi					
Daily vapor pressure range	AP-42, Section 7.1, pg 7.1-18, Eq. 1-9	ΔP_V	0.0020	psia					
Breather vent pressure setting range	AP-42, Section 7.1, pg 7.1-19, Eq. 1-10	ΔP_B	0.06	psig					
Breather vent pressure setting	AP-42, Section 7.1, pg 7.1-19	P_{BP}	0.03	psig					
Breather vent vacuum setting	AP-42, Section 7.1, pg 7.1-19	P_{BV}	(0.03)	psig					
Vent setting correction factor	AP-42, Section 7.1, pg 7.1-28, Eq. 1-37 notes	Kb	1.00	Dimensionless					

INPUT DATA					CALCULATIONS				
	Reference	**Symbol**		**Units**			**Symbol**		**Units**
Calculations for Horizontal Tanks					**Constants**				
Effective Diameter Calculation					Ideal Gas Constant	Input	R	10.731	psia*ft^3/lb-mole**R
Length	Input	L	11.00	ft	ASTM-D86 distillation slope				
Diameter	Input	D	5.63	ft		AP-42, Section 7.1, Table 7.1-2, pg 7.1-92	S		°F/vol %
Effective Diameter	AP-42, Section 7.1, pg 7.1-21, Eq. 1-14	D_e	8.88	ft	Constant in VP Equation	AP-42, Section 7.1, pg 7.1-82, Fig. 7.1-15	A	12.101	Dimensionless
					Constant in VP Equation	AP-42, Section 7.1, pg 7.1-82, Fig. 7.1-15	B	8907	°R
Effective Height Calculation									
Effective Height	AP-42, Section 7.1, pg 7.1-21, Eq. 1-15	H_e	4.422	ft					
Annual Throughput Rate									
Diesel	Air Permit Application	None	24000	gal					

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 6

Flow Diagram Designation
Snag Grinder #1
EU77

Maximum Hourly Capacity
7.50 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Snag Grinder #1
Control Device: Snag Grinder #1 Fabric Filter Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Snag Grinder #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Snag Grinder #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 6

Flow Diagram Designation
Snag Grinder #2
EU78

Maximum Hourly Capacity
7.50 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Snag Grinder #2
Control Device: Snag Grinder #2 Fabric Filter Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Snag Grinder #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Snag Grinder #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
135.0 Tons/Year Note 1

Flow Diagram Designation
Core Wash Station #2
EU79

Maximum Hourly Capacity
0.338 Tons/Hour Note 1

Process Description:
Fritz Winter North America, LP
Core Wash Station #2
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Core Wash Station #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						0.10%			
(source)							Note 2			
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							0.675			
Annual (TPY)							**0.135**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							0.675			
Annual (TPY)							**0.135**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Usage from original permit application
Note 2: VOC Content of product per supplier (0.1% VOC), Kerntop WV 031 111

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Wash Station #2

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
10.0 Tons/Year Note 4

Flow Diagram Designation
Rust Prohibitive Application
EU82

Maximum Hourly Capacity
0.013 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Rust Prohibitive Application
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Rust Prohibitive Application									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						10.00%			
(source)							Note 1,2			
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)						2.500			
	Annual (TPY)						**1.000**			
Total Emission Rate:										
	Hourly (lb/hr)						2.500			
	Annual (TPY)						**1.000**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Weight loss study
Note 2: Usage is for virgin product. Virgin product is thinned with water prior to use.
Note 3: Hourly equipment capacity
Note 4: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Rust Prohibitive Application

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
87,600 Tons/Year

Flow Diagram Designation
Rotary Sprue Cleaner and Conveyors
EU83

Maximum Hourly Capacity
10.00 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Rotary Sprue Cleaner and Conveyors

Control Device: Sand Plant Baghouse (CU06) and Felttling Baghouse (CU11)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Rotary Sprue Cleaner and Conveyors										
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors: lb/ton	0.65	0.540	0.540						
(source)	Note 1	Note 2	Note 3						
Capture Efficiency	100.00	100.00	100.00						
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
Annual (TPY)									
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AIRS Facilities Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants (EPA Document No. 450/4-90-003, March 1990)
Note 2: WebFire SCC 30400350
Note 3: Assume $PM_{2.5}$ is equal to PM_{10} emission factor
Note 4: Potential throughput rate is 6.6 tph sprue/metallics, 10 tph sand. Emission factor based on sand.

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Rotary Sprue Cleaner and Conveyors

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 6

Flow Diagram Designation
Perforation Line #1
EU84

Maximum Hourly Capacity
7.50 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Perforation Line #1
Control Device: Performance Line #1 Cartridge Collector Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Perforation Line #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	See air pollution control device worksheet for stack emissions								
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Perforation Line #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Melt Baghouse (CU01)
CU01

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Melt Baghouse (CU01)

Control Device: Melt Baghouse (CU01)
SCC Code:
Control Device Outlet: 0.0015 gr/dscf Note 1
Airflow: 160,000 acfm Note 2
Stack Gas Temperature: 90 °F Note 3

Facility Process Name:	**Criteria Pollutants**								
Melt Baghouse (CU01)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	1.982	1.982	1.982						
Annual (TPY)	**8.683**	**8.683**	**8.683**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	1.982	1.982	1.982						
Annual (TPY)	**8.683**	**8.683**	**8.683**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM_{10} and $PM_{2.5}$ emission limit
Note 2: Designed air volume
Note 3: Consideration of conditions observed during 2018, 2020 and 2024 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Melt Baghouse (CU01)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 4
Arsenic (As)	7440-38-2	0.0075%			1.49E-04	6.52E-04	**1.49E-04**	**6.52E-04**	Note 4
Beryllium (Be)	7440-41-7								Note 4
Cadmium (Cd)	7440-43-9	0.0051%			1.02E-04	4.45E-04	**1.02E-04**	**4.45E-04**	Note 4
Chromium (Cr)	7440-47-3	0.0491%			9.73E-04	4.26E-03	**9.73E-04**	**4.26E-03**	Note 4
Cobalt (Co)	7440-48-4	0.0036%			7.16E-05	3.13E-04	**7.16E-05**	**3.13E-04**	Note 4
Lead (Pb)	7439-92-1	0.5140%			1.02E-02	4.46E-02	**1.02E-02**	**4.46E-02**	Note 4
Manganese (Mn)	7439-96-5	3.4000%			6.74E-02	2.95E-01	**6.74E-02**	**2.95E-01**	Note 4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0142%			2.81E-04	1.23E-03	**2.81E-04**	**1.23E-03**	Note 4
Selenium (Se)	7782-49-2	0.0027%			5.29E-05	2.32E-04	**5.29E-05**	**2.32E-04**	Note 4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs	**4.00%**			7.92E-02	3.47E-01	7.92E-02	3.47E-01	

Note 4: Pace Analytical Report dated June 10, 2021 (Melt)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)
CU02

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)
Control Device: Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)
SCC Code:
Control Device Outlet: 0.003 gr/dscf Note 1
Airflow: 600 acfm Note 2
Stack Gas Temperature: 70 °F

Facility Process Name:	**Criteria Pollutants**								
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.068**	**0.068**	**0.068**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.068**	**0.068**	**0.068**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
Note 3 8,760 HRS/YEAR

Note 1: Requested BACT PM, PM_{10} and $PM_{2.5}$ emission limit
Note 2: Expected air volume when delivering dust to silo.
Note 3: Assumes delivery of sand is occurring continuously

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 4
Arsenic (As)	7440-38-2	0.0075%			1.16E-06	5.08E-06	**1.16E-06**	**5.08E-06**	Note 4
Beryllium (Be)	7440-41-7	0.0001%			8.16E-09	3.57E-08	**8.16E-09**	**3.57E-08**	Note 4
Cadmium (Cd)	7440-43-9	0.0051%			7.91E-07	3.47E-06	**7.91E-07**	**3.47E-06**	Note 4
Chromium (Cr)	7440-47-3	0.0491%			7.58E-06	3.32E-05	**7.58E-06**	**3.32E-05**	Note 4
Cobalt (Co)	7440-48-4	0.0036%			5.57E-07	2.44E-06	**5.57E-07**	**2.44E-06**	Note 4
Lead (Pb)	7439-92-1	0.5140%			7.93E-05	3.47E-04	**7.93E-05**	**3.47E-04**	Note 4
Manganese (Mn)	7439-96-5	3.4000%			5.25E-04	2.30E-03	**5.25E-04**	**2.30E-03**	Note 4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0142%			2.19E-06	9.60E-06	**2.19E-06**	**9.60E-06**	Note 4
Selenium (Se)	7782-49-2	0.0027%			4.12E-07	1.80E-06	**4.12E-07**	**1.80E-06**	Note 4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs	**4.00%**			6.17E-04	2.70E-03	6.17E-04	2.70E-03	

Note 4: Pace Analytical Report dated June 10, 2021 (maximum value of Melt and Core values)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Mold Silica Sand Silo Bin Vent Filter (CU03)
CU03

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Mold Silica Sand Silo Bin Vent Filter (CU03)

Control Device: Mold Silica Sand Silo Bin Vent Filter (CU03)
SCC Code:
Control Device Outlet: 0.003 gr/dscf Note 1
Airflow: 600 acfm Note 2
Stack Gas Temperature: 70 °F

Facility Process Name:	**Criteria Pollutants**								
Mold Silica Sand Silo Bin Vent Filter (CU03)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.001**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.001**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
1.25 HRS/DAY
Note 3 125 HRS/YEAR

Note 1: Requested BACT PM, PM_{10} and $PM_{2.5}$ emission limit
Note 2: Expected air volume when delivering dust pnuematically from truck to silo.
Note 3: Pnuematic conveying of sand from truck to silo is approximately 1.25 hrs/day, 2 days/week, 50 weeks/yr

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Silica Sand Silo Bin Vent Filter (CU03)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Blend Silo Bin Vent Filter (CU04)
CU04

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Blend Silo Bin Vent Filter (CU04)
Control Device: Blend Silo Bin Vent Filter (CU04)
SCC Code:
Control Device Outlet: 0.003 gr/dscf Note 1
Airflow: 600 acfm Note 2
Stack Gas Temperature: 70 °F

Facility Process Name:	**Criteria Pollutants**								
Blend Silo Bin Vent Filter (CU04)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.001**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.001**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
1.25 HRS/DAY
Note 3 125 HRS/YEAR

Note 1: Requested BACT PM, PM_{10} and $PM_{2.5}$ emission limit
Note 2: Expected air volume when delivering dust pnuematically from truck to silo.
Note 3: Pnuematic conveying of sand from truck to silo is approximately 1.25 hrs/day, 2 days/week, 50 weeks/yr

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Blend Silo Bin Vent Filter (CU04)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Bentonite Silo Bin Vent Filter (CU05)
CU05

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Bentonite Silo Bin Vent Filter (CU05)

Control Device: Bentonite Silo Bin Vent Filter (CU05)
SCC Code:
Control Device Outlet: 0.003 gr/dscf Note 1
Airflow: 600 acfm Note 2
Stack Gas Temperature: 70 °F

Facility Process Name:	**Criteria Pollutants**								
Bentonite Silo Bin Vent Filter (CU05)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.001**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.001**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
1.25 HRS/DAY
Note 3 125 HRS/YEAR

Note 1: Requested BACT PM, PM_{10} and $PM_{2.5}$ emission limit
Note 2: Expected air volume when delivering dust pnuematically from truck to silo.
Note 3: Pnuematic conveying of sand from truck to silo is approximately 1.25 hrs/day, 2 days/week, 50 weeks/yr

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Bentonite Silo Bin Vent Filter (CU05)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Sand Plant Baghouse (CU06)
CU06

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Sand Plant Baghouse (CU06)

Control Device:	Sand Plant Baghouse (CU06)		
SCC Code:			
Control Device Outlet:	0.0020	gr/dscf	Note 1
Airflow:	105,000	acfm	Note 2
Stack Gas Temperature:	85	°F	Note 3

Facility Process Name:	**Criteria Pollutants**								
Sand Plant Baghouse (CU06)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	1.750	1.750	1.750						
Annual (TPY)	**7.667**	**7.667**	**7.667**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	1.750	1.750	1.750						
Annual (TPY)	**7.667**	**7.667**	**7.667**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM_{10} and $PM_{2.5}$ emission limit
Note 2: Designed air volume
Note 3: Consideration of conditions observed during 2018, 2020 and 2024 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Sand Plant Baghouse (CU06)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 4
Arsenic (As)	7440-38-2	0.0003%			6.09E-06	2.67E-05	**6.09E-06**	**2.67E-05**	Note 4
Beryllium (Be)	7440-41-7	0.0001%			1.87E-06	8.20E-06	**1.87E-06**	**8.20E-06**	Note 4
Cadmium (Cd)	7440-43-9	0.0000%			1.96E-07	8.59E-07	**1.96E-07**	**8.59E-07**	Note 4
Chromium (Cr)	7440-47-3	0.0010%			1.69E-05	7.40E-05	**1.69E-05**	**7.40E-05**	Note 4
Cobalt (Co)	7440-48-4	0.0003%			5.20E-06	2.28E-05	**5.20E-06**	**2.28E-05**	Note 4
Lead (Pb)	7439-92-1	0.0019%			3.24E-05	1.42E-04	**3.24E-05**	**1.42E-04**	Note 4
Manganese (Mn)	7439-96-5	0.0152%			2.66E-04	1.17E-03	**2.66E-04**	**1.17E-03**	Note 4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0006%			1.13E-05	4.95E-05	**1.13E-05**	**4.95E-05**	Note 4
Selenium (Se)	7782-49-2	0.0002%			2.87E-06	1.26E-05	**2.87E-06**	**1.26E-05**	Note 4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs	**0.02%**			3.43E-04	1.50E-03	3.43E-04	1.50E-03	

Note 4: Pace Analytical Report dated June 10, 2021 (Sand)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Acid Scrubber (CU07)
CU07

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Acid Scrubber (CU07)

Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: 0.0005 gr/dscf Note 1
Airflow: 7,500 acfm Note 2
Stack Gas Temperature: 80 °F Note 3

Facility Process Name:	**Criteria Pollutants**								
Acid Scrubber (CU07)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.032	0.032	0.032						
Annual (TPY)	**0.138**	**0.138**	**0.138**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.032	0.032	0.032						
Annual (TPY)	**0.138**	**0.138**	**0.138**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM_{10} and $PM_{2.5}$ emission limit
Note 2: Designed air volume for two core machines
Note 3: Consideration of conditions observed during 2018 and 2024 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Acid Scrubber (CU07)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Core/Mold Baghouse (CU08)
CU08

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Core/Mold Baghouse (CU08)

Control Device:	Core/Mold Baghouse (CU08)	
SCC Code:		
Control Device Outlet:	0.002 gr/dscf	Note 1
Airflow:	115,000 acfm	Note 2
Stack Gas Temperature:	90 °F	Note 3

Facility Process Name:	**Criteria Pollutants**								
Core/Mold Baghouse (CU08)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	1.425	1.425	1.425						
Annual (TPY)	**6.241**	**6.241**	**6.241**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	1.425	1.425	1.425						
Annual (TPY)	**6.241**	**6.241**	**6.241**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM_{10} and $PM_{2.5}$ emission limit
Note 2: Designed air volume
Note 3: Consideration of conditions observed during 2019 and 2024 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core/Mold Baghouse (CU08)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 4
Arsenic (As)	7440-38-2	0.0002%			2.31E-06	1.01E-05	**2.31E-06**	**1.01E-05**	Note 4
Beryllium (Be)	7440-41-7	0.0001%			7.54E-07	3.30E-06	**7.54E-07**	**3.30E-06**	Note 4
Cadmium (Cd)	7440-43-9	0.0000%			1.58E-07	6.93E-07	**1.58E-07**	**6.93E-07**	Note 4
Chromium (Cr)	7440-47-3	0.0012%			1.65E-05	7.24E-05	**1.65E-05**	**7.24E-05**	Note 4
Cobalt (Co)	7440-48-4	0.0002%			2.41E-06	1.05E-05	**2.41E-06**	**1.05E-05**	Note 4
Lead (Pb)	7439-92-1	0.0009%			1.30E-05	5.71E-05	**1.30E-05**	**5.71E-05**	Note 4
Manganese (Mn)	7439-96-5	0.0248%			3.53E-04	1.55E-03	**3.53E-04**	**1.55E-03**	Note 4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0005%			7.18E-06	3.15E-05	**7.18E-06**	**3.15E-05**	Note 4
Selenium (Se)	7782-49-2								Note 4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs	**0.03%**			3.96E-04	1.73E-03	3.96E-04	1.73E-03	

Note 4: Pace Analytical Report dated June 10, 2021 (Core)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)
CU10

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)

Control Device:	Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)	
SCC Code:		
Control Device Outlet:	0.003 gr/dscf	Note 1
Airflow:	600 acfm	Note 2
Stack Gas Temperature:	70 °F	

Facility Process Name:	**Criteria Pollutants**								
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.068**	**0.068**	**0.068**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.068**	**0.068**	**0.068**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
Note 3 8,760 HRS/YEAR

Note 1: Requested BACT PM, PM_{10} and $PM_{2.5}$ emission limit
Note 2: Expected air volume when delivering dust to silo.
Note 3: Assumes delivery of sand is occurring continuously

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 4
Arsenic (As)	7440-38-2	0.0003%			5.37E-08	2.35E-07	**5.37E-08**	**2.35E-07**	Note 4
Beryllium (Be)	7440-41-7	0.0001%			1.65E-08	7.23E-08	**1.65E-08**	**7.23E-08**	Note 4
Cadmium (Cd)	7440-43-9	0.0000%			1.73E-09	7.57E-09	**1.73E-09**	**7.57E-09**	Note 4
Chromium (Cr)	7440-47-3	0.0010%			1.49E-07	6.52E-07	**1.49E-07**	**6.52E-07**	Note 4
Cobalt (Co)	7440-48-4	0.0003%			4.58E-08	2.01E-07	**4.58E-08**	**2.01E-07**	Note 4
Lead (Pb)	7439-92-1	0.0019%			2.85E-07	1.25E-06	**2.85E-07**	**1.25E-06**	Note 4
Manganese (Mn)	7439-96-5	0.0152%			2.35E-06	1.03E-05	**2.35E-06**	**1.03E-05**	Note 4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0006%			9.97E-08	4.37E-07	**9.97E-08**	**4.37E-07**	Note 4
Selenium (Se)	7782-49-2	0.0002%			2.53E-08	1.11E-07	**2.53E-08**	**1.11E-07**	Note 4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs	**0.02%**			3.02E-06	1.32E-05	3.02E-06	1.32E-05	

Note 4: Pace Analytical Report dated June 10, 2021 (Sand)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Fettling Baghouse (CU11)
CU11

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Fettling Baghouse (CU11)

Control Device: Fettling Baghouse (CU11)
SCC Code:
Control Device Outlet: 0.001 gr/dscf Note 1
Airflow: 65,000 acfm Note 2
Stack Gas Temperature: 75 °F Note 3

Facility Process Name:	**Criteria Pollutants**								
Fettling Baghouse (CU11)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.552	0.552	0.552						
Annual (TPY)	**2.417**	**2.417**	**2.417**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.552	0.552	0.552						
Annual (TPY)	**2.417**	**2.417**	**2.417**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM_{10} and $PM_{2.5}$ emission limit
Note 2: Designed air volume
Note 3: Consideration of conditions observed during 2018 and 2024 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Fettling Baghouse (CU11)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 4
Arsenic (As)	7440-38-2	0.0019%			1.07E-05	4.69E-05	**1.07E-05**	**4.69E-05**	Note 4
Beryllium (Be)	7440-41-7								Note 4
Cadmium (Cd)	7440-43-9	0.0001%			4.76E-07	2.09E-06	**4.76E-07**	**2.09E-06**	Note 4
Chromium (Cr)	7440-47-3	0.1360%			7.51E-04	3.29E-03	**7.51E-04**	**3.29E-03**	Note 4
Cobalt (Co)	7440-48-4	0.0026%			1.44E-05	6.29E-05	**1.44E-05**	**6.29E-05**	Note 4
Lead (Pb)	7439-92-1	0.0018%			1.00E-05	4.40E-05	**1.00E-05**	**4.40E-05**	Note 4
Manganese (Mn)	7439-96-5	0.8650%			4.77E-03	2.09E-02	**4.77E-03**	**2.09E-02**	Note 4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0375%			2.07E-04	9.07E-04	**2.07E-04**	**9.07E-04**	Note 4
Selenium (Se)	7782-49-2	0.0019%			1.03E-05	4.50E-05	**1.03E-05**	**4.50E-05**	Note 4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs	**1.05%**			5.78E-03	2.53E-02	5.78E-03	2.53E-02	

Note 4: Pace Analytical Report dated June 10, 2021 (Fettling)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)
CU12

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)

Control Device:	Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)		
SCC Code:			
Control Device Outlet:	0.003	gr/dscf	Note 1
Airflow:	600	acfm	Note 2
Stack Gas Temperature:	70	°F	

Facility Process Name:	**Criteria Pollutants**								
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.068**	**0.068**	**0.068**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.068**	**0.068**	**0.068**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
Note 3 8,760 HRS/YEAR

Note 1: Requested BACT PM, PM_{10} and $PM_{2.5}$ emission limit
Note 2: Expected air volume when delivering dust to silo.
Note 3: Assumes delivery of sand is occurring continuously

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 4
Arsenic (As)	7440-38-2	0.0019%			2.99E-07	1.31E-06	**2.99E-07**	**1.31E-06**	Note 4
Beryllium (Be)	7440-41-7								Note 4
Cadmium (Cd)	7440-43-9	0.0001%			1.33E-08	5.83E-08	**1.33E-08**	**5.83E-08**	Note 4
Chromium (Cr)	7440-47-3	0.1360%			2.10E-05	9.19E-05	**2.10E-05**	**9.19E-05**	Note 4
Cobalt (Co)	7440-48-4	0.0026%			4.01E-07	1.76E-06	**4.01E-07**	**1.76E-06**	Note 4
Lead (Pb)	7439-92-1	0.0018%			2.81E-07	1.23E-06	**2.81E-07**	**1.23E-06**	Note 4
Manganese (Mn)	7439-96-5	0.8650%			1.33E-04	5.85E-04	**1.33E-04**	**5.85E-04**	Note 4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0375%			5.79E-06	2.53E-05	**5.79E-06**	**2.53E-05**	Note 4
Selenium (Se)	7782-49-2	0.0019%			2.87E-07	1.26E-06	**2.87E-07**	**1.26E-06**	Note 4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs	**1.05%**			1.62E-04	7.07E-04	1.62E-04	7.07E-04	

Note 4: Pace Analytical Report dated June 10, 2021 (Fettling)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Machining Cartridge Collectors (CU13a-h)
CU13a-h

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Machining Cartridge Collectors (CU13a-h)

Control Device: Machining Cartridge Collectors (CU13a-h) Note 1,2,3
SCC Code:
Control Device Outlet: 0.001 gr/dscf
Airflow: 11,768 acfm
Stack Gas Temperature: 70 °F

Facility Process Name:	**Criteria Pollutants**								
Machining Cartridge Collectors (CU13a-h)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.101	0.101	0.101						
Annual (TPY)	**0.442**	**0.442**	**0.442**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.101	0.101	0.101						
Annual (TPY)	**0.442**	**0.442**	**0.442**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Control device emits into plant environment as fugitive emissions.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.l)
Note 3: Emissions are captured and emitted via Paint Line #1 Booth Filter (CU17) stack (ST15c)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Machining Cartridge Collectors (CU13a-h)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 3,4
Arsenic (As)	7440-38-2	0.0019%			1.96E-06	8.57E-06	**1.96E-06**	**8.57E-06**	Note 3,4
Beryllium (Be)	7440-41-7								Note 3,4
Cadmium (Cd)	7440-43-9	0.0001%			8.70E-08	3.81E-07	**8.70E-08**	**3.81E-07**	Note 3,4
Chromium (Cr)	7440-47-3	0.1360%			1.37E-04	6.01E-04	**1.37E-04**	**6.01E-04**	Note 3,4
Cobalt (Co)	7440-48-4	0.0026%			2.62E-06	1.15E-05	**2.62E-06**	**1.15E-05**	Note 3,4
Lead (Pb)	7439-92-1	0.0018%			1.84E-06	8.04E-06	**1.84E-06**	**8.04E-06**	Note 3,4
Manganese (Mn)	7439-96-5	0.8650%			8.73E-04	3.82E-03	**8.73E-04**	**3.82E-03**	Note 3,4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0375%			3.78E-05	1.66E-04	**3.78E-05**	**1.66E-04**	Note 3,4
Selenium (Se)	7782-49-2	0.0019%			1.88E-06	8.22E-06	**1.88E-06**	**8.22E-06**	Note 3,4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs	**1.05%**			1.06E-03	4.62E-03	1.06E-03	4.62E-03	

Note 4: Pace Analytical Report dated June 10, 2021 (Fettling)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Perforation Line #1 Cartridge Collector (CU13i)
CU13i

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Perforation Line #1 Cartridge Collector (CU13i)

Control Device: Perforation Line #1 Cartridge Collector (CU13i) Note 1,2,3
SCC Code:
Control Device Outlet: 0.001 gr/dscf
Airflow: 5,884 acfm
Stack Gas Temperature: 70 °F

Facility Process Name:	**Criteria Pollutants**								
Perforation Line #1 Cartridge Collector (CU13i)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.050	0.050	0.050						
Annual (TPY)	**0.221**	**0.221**	**0.221**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.050	0.050	0.050						
Annual (TPY)	**0.221**	**0.221**	**0.221**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Control device emits into plant environment as fugitive emissions.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Emissions are captured and emitted via Paint Line #1 Booth Filter (CU17) stack (ST15c)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Perforation Line #1 Cartridge Collector (CU13i)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 3,4
Arsenic (As)	7440-38-2	0.0019%			9.78E-07	4.29E-06	**9.78E-07**	**4.29E-06**	Note 3,4
Beryllium (Be)	7440-41-7								Note 3,4
Cadmium (Cd)	7440-43-9	0.0001%			4.35E-08	1.91E-07	**4.35E-08**	**1.91E-07**	Note 3,4
Chromium (Cr)	7440-47-3	0.1360%			6.86E-05	3.00E-04	**6.86E-05**	**3.00E-04**	Note 3,4
Cobalt (Co)	7440-48-4	0.0026%			1.31E-06	5.74E-06	**1.31E-06**	**5.74E-06**	Note 3,4
Lead (Pb)	7439-92-1	0.0018%			9.18E-07	4.02E-06	**9.18E-07**	**4.02E-06**	Note 3,4
Manganese (Mn)	7439-96-5	0.8650%			4.36E-04	1.91E-03	**4.36E-04**	**1.91E-03**	Note 3,4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0375%			1.89E-05	8.28E-05	**1.89E-05**	**8.28E-05**	Note 3,4
Selenium (Se)	7782-49-2	0.0019%			9.38E-07	4.11E-06	**9.38E-07**	**4.11E-06**	Note 3,4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs	**1.05%**			5.28E-04	2.31E-03	5.28E-04	2.31E-03	

Note 4: Pace Analytical Report dated June 10, 2021 (Fettling)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Perforation Line #2 Cartridge Collector (CU13j)
CU13j

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Perforation Line #2 Cartridge Collector (CU13j)

Control Device: Perforation Line #2 Cartridge Collector (CU13j) Note 1,2,3
SCC Code:
Control Device Outlet: 0.001 gr/dscf
Airflow: 5,884 acfm
Stack Gas Temperature: 70 °F

Facility Process Name:	**Criteria Pollutants**								
Perforation Line #2 Cartridge Collector (CU13j)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.050	0.050	0.050						
Annual (TPY)	**0.221**	**0.221**	**0.221**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.050	0.050	0.050						
Annual (TPY)	**0.221**	**0.221**	**0.221**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Control device emits into plant environment as fugitive emissions.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Emissions are captured and emitted via Paint Line #1 Booth Filter (CU17) stack (ST15c)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Perforation Line #2 Cartridge Collector (CU13j)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 3,4
Arsenic (As)	7440-38-2	0.0019%			9.78E-07	4.29E-06	**9.78E-07**	**4.29E-06**	Note 3,4
Beryllium (Be)	7440-41-7								Note 3,4
Cadmium (Cd)	7440-43-9	0.0001%			4.35E-08	1.91E-07	**4.35E-08**	**1.91E-07**	Note 3,4
Chromium (Cr)	7440-47-3	0.1360%			6.86E-05	3.00E-04	**6.86E-05**	**3.00E-04**	Note 3,4
Cobalt (Co)	7440-48-4	0.0026%			1.31E-06	5.74E-06	**1.31E-06**	**5.74E-06**	Note 3,4
Lead (Pb)	7439-92-1	0.0018%			9.18E-07	4.02E-06	**9.18E-07**	**4.02E-06**	Note 3,4
Manganese (Mn)	7439-96-5	0.8650%			4.36E-04	1.91E-03	**4.36E-04**	**1.91E-03**	Note 3,4
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0	0.0375%			1.89E-05	8.28E-05	**1.89E-05**	**8.28E-05**	Note 3,4
Selenium (Se)	7782-49-2	0.0019%			9.38E-07	4.11E-06	**9.38E-07**	**4.11E-06**	Note 3,4
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs	**1.05%**			5.28E-04	2.31E-03	5.28E-04	2.31E-03	

Note 4: Pace Analytical Report dated June 10, 2021 (Fettling)

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Paint Line #3 Booth Filter (CU14)
CU14

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #3 Booth Filter (CU14)

Control Device:	Paint Line #3 Booth Filter (CU14)		
SCC Code:			
Control Device Outlet:	0.0028	gr/dscf	Note 1
Airflow:	2,750	acfm	Note 2
Stack Gas Temperature:	90	°F	Note 3

Facility Process Name:	**Criteria Pollutants**								
Paint Line #3 Booth Filter (CU14)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency	100.00	100.00	100.00						
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.064	0.064	0.064						
Annual (TPY)	**0.279**	**0.279**	**0.279**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.064	0.064	0.064						
Annual (TPY)	**0.279**	**0.279**	**0.279**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM_{10} and $PM_{2.5}$ emission limit
Note 2: Designed air volume
Note 3: Consideration of conditions observed during 2024 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #3 Booth Filter (CU14)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #3 Booth Filter (CU14)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6								
Zinc (TAC)	7440-66-6	77.60%			4.94E-02	2.16E-01	**4.94E-02**	**2.16E-01**	Note 4,5
Zinc Oxide (TAC)	1314-13-2	2.40%			1.53E-03	6.69E-03	**1.53E-03**	**6.69E-03**	Note 4,5
n-Butyl Acetate (TAC)	123-86-4								
Solvent Naphtha (TAC)	64742-95-6								
1-Butanol (TAC)	71-36-3								
Mesitylene (TAC)	108-67-6								
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Paint Line #2 Booth Filter (CU15)
CU15

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Paint Line #2 Booth Filter (CU15)

Control Device:	Paint Line #2 Booth Filter (CU15)		
SCC Code:			
Control Device Outlet:	0.0022	gr/dscf	Note 1
Airflow:	3,500	acfm	Note 2
Stack Gas Temperature:	90	°F	Note 2

Facility Process Name:	**Criteria Pollutants**								
Paint Line #2 Booth Filter (CU15)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency	100.00	100.00	100.00						
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.064	0.064	0.064						
Annual (TPY)	**0.279**	**0.279**	**0.279**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.064	0.064	0.064						
Annual (TPY)	**0.279**	**0.279**	**0.279**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM_{10} and $PM_{2.5}$ emission limit
Note 2: Consideration of conditions observed during 2018 and 2024 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #2 Booth Filter (CU15)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #2 Booth Filter (CU15)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6								
Zinc (TAC)	7440-66-6	77.60%			4.94E-02	2.16E-01	4.94E-02	**2.16E-01**	Note 4,5
Zinc Oxide (TAC)	1314-13-2	2.40%			1.53E-03	6.69E-03	1.53E-03	**6.69E-03**	Note 4,5
n-Butyl Acetate (TAC)	123-86-4								
Solvent Naphtha (TAC)	64742-95-6								
1-Butanol (TAC)	71-36-3								
Mesitylene (TAC)	108-67-6								
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Maximum Hourly Capacity
Tons/Hour

Flow Diagram Designation
Paint Line #1 Booth Filter (CU17)
CU17

Process Description:
Fritz Winter North America, LP
Paint Line #1 Booth Filter (CU17)

Control Device: Paint Line #1 Booth Filter (CU17)
SCC Code:
Control Device Outlet: 0.0035 gr/dscf Note 1
Airflow: 20,310 acfm Note 2
Stack Gas Temperature: 90 °F Note 3

Facility Process Name:	**Criteria Pollutants**								
Paint Line #1 Booth Filter (CU17)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency	100.00	100.00	100.00						
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.587	0.587	0.587						
Annual (TPY)	**2.572**	**2.572**	**2.572**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.587	0.587	0.587						
Annual (TPY)	**2.572**	**2.572**	**2.572**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM_{10} and $PM_{2.5}$ emission limit
Note 2: Designed air volume
Note 3: Consideration of conditions observed during 2018 and 2024 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #1 Booth Filter (CU17)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #1 Booth Filter (CU17)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6								
Zinc (TAC)	7440-66-6	25.00%			1.47E-01	6.43E-01	**1.47E-01**	**6.43E-01**	Note 4
Zinc Oxide (TAC)	1314-13-2								
n-Butyl Acetate (TAC)	123-86-4								
Solvent Naphtha (TAC)	64742-95-6								
1-Butanol (TAC)	71-36-3								
Mesitylene (TAC)	108-67-6								
Aluminum Powder (TAC)	7429-90-5	8.50%			4.99E-02	2.19E-01	**4.99E-02**	**2.19E-01**	Note 4
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
MMCF/Year

Flow Diagram Designation
Core Silica Sand Silo A Bin Vent Filter (CU19)
CU19

Maximum Hourly Capacity
MMCF/Hour

Process Description:
Fritz Winter North America, LP
Core Silica Sand Silo A Bin Vent Filter (CU19)

Control Device: Core Silica Sand Silo A Bin Vent Filter (CU19) Note 1,2,3
SCC Code:
Control Device Outlet: 0.003 gr/dscf
Airflow: 600 acfm
Stack Gas Temperature: 70 °F

Facility Process Name:	**Criteria Pollutants**								
Core Silica Sand Silo A Bin Vent Filter (CU19)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.001**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.001**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
Note 4 1.25 HRS/DAY
Note 4 125 HRS/YEAR

Note 1: Control device emits into plant environment as fugitive emissions.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Emissions are captured and emitted via Core/Mold Baghouse (CU08) stack (ST09)
Note 4: Pnuematic conveying of sand from truck to silo is approximately 1.25 hrs/day, 2 days/week, 50 weeks/yr

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Silica Sand Silo A Bin Vent Filter (CU19)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
MMCF/Year

Flow Diagram Designation
Core Silica Sand Silo B Bin Vent Filter (CU20)
CU20

Maximum Hourly Capacity
MMCF/Hour

Process Description:
Fritz Winter North America, LP
Core Silica Sand Silo B Bin Vent Filter (CU20)

Control Device: Core Silica Sand Silo B Bin Vent Filter (CU20) Note 1,2,3
SCC Code:
Control Device Outlet: 0.003 gr/dscf
Airflow: 600 acfm
Stack Gas Temperature: 70 °F

Facility Process Name:	**Criteria Pollutants**								
Core Silica Sand Silo B Bin Vent Filter (CU20)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.001**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.015	0.015	0.015						
Annual (TPY)	**0.001**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
Note 4 1.25 HRS/DAY
Note 4 125 HRS/YEAR

Note 1: Control device emits into plant environment as fugitive emissions.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Emissions are captured and emitted via Core/Mold Baghouse (CU08) stack (ST09)
Note 4: Pnuematic conveying of sand from truck to silo is approximately 1.25 hrs/day, 2 days/week, 50 weeks/yr

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Silica Sand Silo B Bin Vent Filter (CU20)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Snag Grinder #1 Fabric Filter (CU21)
CU21

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Snag Grinder #1 Fabric Filter (CU21)

Control Device:	Snag Grinder #1 Fabric Filter (CU21)	Note 1,2,3
SCC Code:		
Control Device Outlet:	0.003 gr/dscf	
Airflow:	1,500 acfm	
Stack Gas Temperature:	70 °F	

Facility Process Name:	**Criteria Pollutants**								
Snag Grinder #1 Fabric Filter (CU21)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.039	0.039	0.039						
Annual (TPY)	**0.169**	**0.169**	**0.169**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.039	0.039	0.039						
Annual (TPY)	**0.169**	**0.169**	**0.169**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Control device emits into plant environment as fugitive emissions.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Emissions are captured and emitted via Fettling Baghouse (CU11) stack (ST12)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Snag Grinder #1 Fabric Filter (CU21)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 3
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs								

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Flow Diagram Designation
Snag Grinder #2 Fabric Filter (CU22)
CU22

Maximum Hourly Capacity
Tons/Hour

Process Description:
Fritz Winter North America, LP
Snag Grinder #2 Fabric Filter (CU22)

Control Device:	Snag Grinder #2 Fabric Filter (CU22)	Note 1,2,3
SCC Code:		
Control Device Outlet:	0.003 gr/dscf	
Airflow:	1,500 acfm	
Stack Gas Temperature:	70 °F	

Facility Process Name:	**Criteria Pollutants**								
Snag Grinder #2 Fabric Filter (CU22)									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.039	0.039	0.039						
Annual (TPY)	**0.169**	**0.169**	**0.169**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.039	0.039	0.039						
Annual (TPY)	**0.169**	**0.169**	**0.169**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Control device emits into plant environment as fugitive emissions.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Emissions are captured and emitted via Fettling Baghouse (CU11) stack (ST12)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Air Pollution Control Device Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Snag Grinder #2 Fabric Filter (CU22)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								Note 3
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs								

Appendix E
Uncontrolled Emission Calculations – Form DEP7007N

Facility Summary
Uncontrolled Hourly Emissions

PROCESS	EU ID	Stack ID	Emissions Estimates - PSD Regulated Pollutants lbs/hr								
			PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO2e
Charge Handling	EU01	ST02	1.050	1.050	0.900						
Refractory Burner #1	EU05	ST02	0.063	0.063	0.063	0.005	0.833	0.046	0.700	0.000	1000.000
Refractory Burner #2	EU06	ST02	0.063	0.063	0.063	0.005	0.833	0.046	0.700	0.000	1000.000
Induction Furnace #1	EU07	ST02	9.000	8.600	8.460			2.341	13.944	0.140	
Induction Furnace #2	EU08	ST02	9.000	8.600	8.460			2.341	13.944	0.140	
Induction Furnace #3	EU09	ST02	9.000	8.600	8.460			2.341	13.944	0.140	
Induction Furnace #4	EU10	ST02	9.000	8.600	8.460			2.341	13.944	0.140	
Hot Metal Transfer	EU13	ST02	0.840	0.773	0.689						
Pouring Furnace #1	EU15	ST02	*0.022*	*0.022*	*0.022*	*0.002*	*0.285*	*0.016*	*0.240*	*0.000*	*342.353*
Melt and Core/Mold Baghouse Dust Silo	EU17	ST03	0.091	0.091	0.091						
Refractory Curing Mobile Burner	EU18	ST02	*0.015*	*0.015*	*0.015*	*0.001*	*0.196*	*0.011*	*0.165*	*0.000*	*235.294*
Mold Silica Sand Silo	EU19	ST04	*6.000*	*6.000*	*6.000*						
Blend Silo	EU20	ST05	6.000	6.000	6.000						
Bentonite Silo	EU21	ST06	6.000	6.000	6.000						
Mold Sand Handling and Preparation	EU22	ST07	712.800	106.920	106.920						
Mold Making #1	EU33	ST09	0.600	0.600	0.600						
Core Silica Sand Silo A	EU35A	FUG	*6.000*	*6.000*	*6.000*						
Core Silica Sand Silo B	EU35B	FUG	6.000	6.000	6.000						
Core Sand Handling and Preparation	EU36	ST09	1.209	1.004	1.004						
PUCB Core Machine #1(Resin)	EU39	ST09	0.278	0.278	0.278			0.104			
PUCB Core Machine #1(Resin+Cat)	EU39	ST08	0.324	0.324	0.324			8.569			
PUCB Core Machine #1 (Core Release)	EU39	ST08						3.570			
PUCB Core Machine #2(Resin)	EU40	ST09	0.278	0.278	0.278			0.104			
PUCB Core Machine #2(Resin+Cat)	EU40	ST08	0.324	0.324	0.324			8.569			
PUCB Core Machine #2 (Core Release)	EU40	ST08						3.570			
Core Wash Station #1	EU43	ST09						*0.675*			
Core Dryer #1	EU44	ST09	*0.030*	*0.030*	*0.030*	*0.002*	*0.392*	*0.022*	*0.329*	*0.000*	*470.588*
Core Dryer #2	EU45	ST09	*0.030*	*0.030*	*0.030*	*0.002*	*0.392*	*0.022*	*0.329*	*0.000*	*470.588*
Pouring #1	EU50	ST09	*6.150*	*6.150*	*5.043*	*0.300*	*0.150*	*53.101*	*92.488*	*0.007*	
Mold Cooling	EU52	ST09									
Shakeout Conveyor	EU53	ST07	*48.000*	*33.600*	*20.102*			*9.240*	*7.725*		
Sand Plant Waste Sand Silo	EU57	ST11	*0.091*	*0.091*	*0.091*						
Casting Cooling	EU59	ST09	*0.480*	*0.336*	*0.201*						
Sorting Conveyor	EU60	ST12	*0.240*	*0.168*	*0.101*						
Steel Shot Blasting #1	EU61	ST12	*232.500*	*25.500*	*25.500*						
Fettling Baghouse Waste Dust Silo	EU63	ST13	0.091	0.091	0.091						
Auto Grinding #1	EU64	ST12	12.000	0.034	0.034						
Auto Grinding #2	EU65	ST12	12.000	0.034	0.034						
Machining Lines (9)	EU66	FUG	24.000	0.068	0.068						
Perforation Line #2	EU67	FUG	12.000	0.034	0.034						
Paint Line #3 (Coating)	EU68	ST15A	*2.349*	*2.349*	*2.349*			*2.430*			
Paint Line #3 (Thinner)	EU68	ST15A						*1.000*			
Paint Line #2(Coating)	EU69	ST15B	*2.349*	*2.349*	*2.349*			*2.430*			
Paint Line #2(Thinner)	EU69	ST15B						*1.000*			
Paint Line #1	EU71	ST16	*0.677*	*0.677*	*0.677*			*0.992*			
Emergency Generator #1	EU72	STG1	*0.512*	*0.512*	*0.512*	*11.135*	*23.520*	*0.662*	*6.248*		*1212.750*
Emergency Generator #2	EU73	STG2	*0.512*	*0.512*	*0.512*	*11.172*	*23.520*	*0.662*	*6.248*		*1212.750*
Emergency Generator #3	EU74	STG3	*0.122*	*0.122*	*0.122*	*0.114*	*1.729*	*0.137*	*0.372*		*64.288*
Diesel Storage Tank	EU75	STTK1						*0.918*			
Snag Grinder #1	EU77	FUG	12.000	0.034	0.034						
Snag Grinder #2	EU78	FUG	*12.000*	*0.034*	*0.034*						
Core Wash Station #2	EU79	ST09						*0.675*			
Rust Prohibitive Application	EU82	ST16						*2.500*			
Rotary Sprue Cleaner and Conveyors	EU83	ST12	*6.500*	*5.400*	*5.400*						
Perforation Line #1	EU84	FUG	*32.000*	*0.090*	*0.090*						
Total Emissions			**1200.59**	**254.45**	**238.85**	**22.74**	**51.85**	**110.43**	**171.32**	**0.57**	**6008.61**

Facility Summary (Annual)

PROCESS	EU ID	Stack ID	Emissions Estimates - PSD Regulated Pollutants (Tons/Year)								
			PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO2e
Charge Handling	EU01	ST02	2.800	2.800	2.400						
Refractory Burner #1	EU05	ST02	0.277	0.277	0.277	0.022	3.650	0.201	3.066	0.000	4380.000
Refractory Burner #2	EU06	ST02	0.277	0.277	0.277	0.022	3.650	0.201	3.066	0.000	4380.000
Induction Furnace #1	EU07	ST02	9.000	8.600	8.460			2.341	13.944	0.140	
Induction Furnace #2	EU08	ST02	9.000	8.600	8.460			2.341	13.944	0.140	
Induction Furnace #3	EU09	ST02	9.000	8.600	8.460			2.341	13.944	0.140	
Induction Furnace #4	EU10	ST02	9.000	8.600	8.460			2.341	13.944	0.140	
Hot Metal Transfer	EU13	ST02	2.240	2.061	1.837						
Pouring Furnace #1	EU15	ST02	*0.095*	*0.095*	*0.095*	*0.007*	*1.250*	*0.069*	*1.050*	*0.000*	*1499.506*
Melt and Core/Mold Baghouse Dust Silo	EU17	ST03	0.399	0.399	0.399						
Refractory Curing Mobile Burner	EU18	ST02	*0.065*	*0.065*	*0.065*	*0.005*	*0.859*	*0.047*	*0.721*	*0.000*	*1030.588*
Mold Silica Sand Silo	EU19	ST04	2.520	2.520	2.520						
Blend Silo	EU20	ST05	0.660	0.660	0.660						
Bentonite Silo	EU21	ST06	0.420	0.420	0.420						
Mold Sand Handling and Preparation	EU22	ST07	1290.168	193.525	193.525						
Mold Making #1	EU33	ST09	1.600	1.600	1.600						
Core Silica Sand Silo A	EU35A	ST09	*0.401*	*0.401*	*0.401*						
Core Silica Sand Silo B	EU35B	ST09	0.401	0.401	0.401						
Core Sand Handling and Preparation	EU36	ST09	2.174	1.806	1.806						
PUCB Core Machine #1(Resin)	EU39	ST09	0.502	0.502	0.502			0.189			
PUCB Core Machine #1(Resin+Cat)	EU39	ST08	0.585	0.585	0.585			15.494			
PUCB Core Machine #1 (Core Release)	EU39	ST08						6.545			
PUCB Core Machine #2(Resin)	EU40	ST09	0.502	0.502	0.502			0.189			
PUCB Core Machine #2(Resin+Cat)	EU40	ST08	*0.585*	*0.585*	*0.585*			*15.494*			
PUCB Core Machine #2 (Core Release)	EU40	ST08						*6.545*			
Core Wash Station #1	EU43	ST09						*0.135*			
Core Dryer #1	EU44	ST09	*0.131*	*0.131*	*0.131*	*0.010*	*1.718*	*0.094*	*1.443*	*0.000*	*2061.176*
Core Dryer #2	EU45	ST09	*0.131*	*0.131*	*0.131*	*0.010*	*1.718*	*0.094*	*1.443*	*0.000*	*2061.176*
Pouring #1	EU50	ST09	*16.400*	*16.400*	*13.448*	*0.800*	*0.400*	*141.604*	*246.634*	*0.019*	
Mold Cooling	EU52	ST09									
Shakeout Conveyor	EU53	ST07	*128.000*	*89.600*	*53.606*			*24.640*	*20.600*		
Sand Plant Waste Sand Silo	EU57	ST11	*0.399*	*0.399*	*0.399*						
Casting Cooling	EU59	ST09	*1.280*	*0.896*	*0.536*						
Sorting Conveyor	EU60	ST12	*0.640*	*0.448*	*0.268*						
Steel Shot Blasting #1	EU61	ST12	*620.000*	*68.000*	*68.000*						
Fettling Baghouse Waste Dust Silo	EU63	ST13	0.399	0.399	0.399						
Auto Grinding #1	EU64	ST12	32.000	0.090	0.090						
Auto Grinding #2	EU65	ST12	32.000	0.090	0.090						
Machining Lines (9)	EU66	ST16	64.000	0.180	0.180						
Perforation Line #2	EU67	ST16	32.000	0.090	0.090						
Paint Line #3 (Coating)	EU68	ST15A	9.396	9.396	9.396			9.720			
Paint Line #3 (Thinner)	EU68	ST15A						4.000			
Paint Line #2(Coating)	EU69	ST15B	*9.396*	*9.396*	*9.396*			*9.720*			
Paint Line #2(Thinner)	EU69	ST15B						*4.000*			
Paint Line #1	EU71	ST16	*1.230*	*1.230*	*1.230*			*1.804*			
Emergency Generator #1	EU72	STG1	*0.026*	*0.026*	*0.026*	*0.557*	*1.176*	*0.033*	*0.312*		*60.638*
Emergency Generator #2	EU73	STG2	*0.026*	*0.026*	*0.026*	*0.559*	*1.176*	*0.033*	*0.312*		*60.638*
Emergency Generator #3	EU74	STG3	*0.006*	*0.006*	*0.006*	*0.006*	*0.086*	*0.007*	*0.019*		*3.214*
Diesel Storage Tank	EU75	STTK1						*0.918*			
Snag Grinder #1	EU77	ST12	*32.000*	*0.090*	*0.090*						
Snag Grinder #2	EU78	ST12	*32.000*	*0.090*	*0.090*						
Core Wash Station #2	EU79	ST09						*0.135*			
Rust Prohibitive Application	EU82	ST16						*1.000*			
Rotary Sprue Cleaner and Conveyors	EU83	ST12	*28.470*	*23.652*	*23.652*						
Perforation Line #1	EU84	ST16	*32.000*	*0.090*	*0.090*						
Total Emissions			**2414.60**	**464.74**	**424.07**	**2.00**	**15.68**	**252.27**	**334.44**	**0.58**	**15536.94**

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 5

Flow Diagram Designation
Charge Handling
EU01

Maximum Hourly Capacity
15.00 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Charge Handling
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Charge Handling										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		0.07	0.07	0.06						
(source)		Note 1	Note 1	Note 2						
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)		1.050	1.050	0.900						
Annual (TPY)		**2.800**	**2.800**	**2.400**						
Total Emission Rate:										
Hourly (lb/hr)		1.050	1.050	0.900						
Annual (TPY)		**2.800**	**2.800**	**2.400**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Gutow Article, Modern Casting; January 1972; PM emissions from Raw material handling (0.04 lbs/ton) and charge makeup (0.03 lbs/ton) released to the atmosphere. All PM emission were conservatively assumed to be PM-10 emissions.
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to $PM_{2.5}$ ratio and uncontrolled PM emission factor.
Note 3: The Alloy Storage emission unit (EU02) is included in this emission unit.
Note 5: Hourly capacity based on potential Pouring (EU50) throughput rate
Note 6: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Charge Handling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Applicaiton
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
73.00 MMCF/Year Note 3

Flow Diagram Designation
Refractory Burner #1
EU05

Maximum Hourly Capacity
0.008 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Refractory Burner #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Refractory Burner #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.063	0.063	0.063	0.005	0.833	0.046	0.700	4.17E-06	1000.000
	Annual (TPY)		**0.277**	**0.277**	**0.277**	**0.022**	**3.650**	**0.201**	**3.066**	1.83E-05	**4380.000**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.063	0.063	0.063	0.005	0.833	0.046	0.700	4.17E-06	1000.000
	Annual (TPY)		**0.277**	**0.277**	**0.277**	**0.022**	**3.650**	**0.201**	**3.066**	**1.83E-05**	**4380.000**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 8.5 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Applicaiton
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Refractory Burner #1

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			1.67E-06	7.30E-06	**1.67E-06**	**7.30E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			1.00E-07	4.38E-07	**1.00E-07**	**4.38E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			9.17E-06	4.02E-05	**9.17E-06**	**4.02E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			1.17E-05	5.11E-05	**1.17E-05**	**5.11E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			7.00E-07	3.07E-06	**7.00E-07**	**3.07E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			3.17E-06	1.39E-05	**3.17E-06**	**1.39E-05**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			2.17E-06	9.49E-06	**2.17E-06**	**9.49E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			1.75E-05	7.67E-05	**1.75E-05**	**7.67E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			2.00E-07	8.76E-07	**2.00E-07**	**8.76E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			2.00E-08	8.76E-08	**2.00E-08**	**8.76E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			1.75E-05	7.67E-05	**1.75E-05**	**7.67E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			1.00E-05	4.38E-05	**1.00E-05**	**4.38E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			6.25E-04	2.74E-03	**6.25E-04**	**2.74E-03**	Note 1
Hexane	110-54-3	1.80E+00			1.50E-02	6.57E-02	**1.50E-02**	**6.57E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			5.08E-06	2.23E-05	**5.08E-06**	**2.23E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			2.83E-05	1.24E-04	**2.83E-05**	**1.24E-04**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			2.00E-07	8.76E-07	**2.00E-07**	**8.76E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			1.33E-07	5.84E-07	**1.33E-07**	**5.84E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			2.50E-08	1.10E-07	**2.50E-08**	**1.10E-07**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			2.33E-08	1.02E-07	**2.33E-08**	**1.02E-07**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			1.42E-07	6.21E-07	**1.42E-07**	**6.21E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			4.17E-08	1.83E-07	**4.17E-08**	**1.83E-07**	Note 1,3
	Total HAPs				1.57E-02	6.89E-02	**1.57E-02**	**6.89E-02**	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
73.00 MMCF/Year Note 3

Flow Diagram Designation
Refractory Burner #2
EU06

Maximum Hourly Capacity
0.008 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Refractory Burner #2
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Refractory Burner #2										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.063	0.063	0.063	0.005	0.833	0.046	0.700	4.17E-06	1000.000
	Annual (TPY)		**0.277**	**0.277**	**0.277**	**0.022**	**3.650**	**0.201**	**3.066**	1.83E-05	**4380.000**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.063	0.063	0.063	0.005	0.833	0.046	0.700	4.17E-06	1000.000
	Annual (TPY)		**0.277**	**0.277**	**0.277**	**0.022**	**3.650**	**0.201**	**3.066**	**1.83E-05**	**4380.000**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 8.5 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Refractory Burner #2

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			1.67E-06	7.30E-06	**1.67E-06**	**7.30E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			1.00E-07	4.38E-07	**1.00E-07**	**4.38E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			9.17E-06	4.02E-05	**9.17E-06**	**4.02E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			1.17E-05	5.11E-05	**1.17E-05**	**5.11E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			7.00E-07	3.07E-06	**7.00E-07**	**3.07E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			3.17E-06	1.39E-05	**3.17E-06**	**1.39E-05**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			2.17E-06	9.49E-06	**2.17E-06**	**9.49E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			1.75E-05	7.67E-05	**1.75E-05**	**7.67E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			2.00E-07	8.76E-07	**2.00E-07**	**8.76E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			2.00E-08	8.76E-08	**2.00E-08**	**8.76E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			1.75E-05	7.67E-05	**1.75E-05**	**7.67E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			1.00E-05	4.38E-05	**1.00E-05**	**4.38E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			6.25E-04	2.74E-03	**6.25E-04**	**2.74E-03**	Note 1
Hexane	110-54-3	1.80E+00			1.50E-02	6.57E-02	**1.50E-02**	**6.57E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			5.08E-06	2.23E-05	**5.08E-06**	**2.23E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			2.83E-05	1.24E-04	**2.83E-05**	**1.24E-04**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			2.00E-07	8.76E-07	**2.00E-07**	**8.76E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			1.33E-07	5.84E-07	**1.33E-07**	**5.84E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			2.50E-08	1.10E-07	**2.50E-08**	**1.10E-07**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			2.33E-08	1.02E-07	**2.33E-08**	**1.02E-07**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			1.42E-07	6.21E-07	**1.42E-07**	**6.21E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			4.17E-08	1.83E-07	**4.17E-08**	**1.83E-07**	Note 1,3
Total HAPs					1.57E-02	6.89E-02	**1.57E-02**	**6.89E-02**	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
20,000 Tons/Year Note 6

Flow Diagram Designation
Induction Furnace #1
EU07

Maximum Hourly Capacity
10.00 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Induction Furnace #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.23	1.39	0.014	
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	9.000	8.600	8.460			2.341	13.944	0.140	
	Annual (TPY)	**9.000**	**8.600**	**8.460**			**2.341**	**13.944**	**0.140**	
Total Emission Rate:										
	Hourly (lb/hr)	9.000	8.600	8.460			2.341	13.944	0.140	
	Annual (TPY)	**9.000**	**8.600**	**8.460**			**2.341**	**13.944**	**0.140**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: Based on upper 95th% Confidence Interval of 2020 and 2024 CU01_ST02 stack test results; considering other units vented to this stack
Note 4: CERP Test Report #RE2000084 CO (6/15/2003), Table 3
Note 5: Equipment hourly capacity
Note 6: 1/4 of the requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
20,000 Tons/Year Note 6

Flow Diagram Designation
Induction Furnace #2
EU08

Maximum Hourly Capacity
10.00 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Induction Furnace #2
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Induction Furnace #2										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.23	1.39	0.01	
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	9.000	8.600	8.460			2.341	13.944	0.140	
	Annual (TPY)	**9.000**	**8.600**	**8.460**			**2.341**	**13.944**	**0.140**	
Total Emission Rate:										
	Hourly (lb/hr)	9.000	8.600	8.460			2.341	13.944	0.140	
	Annual (TPY)	**9.000**	**8.600**	**8.460**			**2.341**	**13.944**	**0.140**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: Based on upper 95th% Confidence Interval of 2020 and 2024 CU01_ST02 stack test results; considering other units vented to this stack
Note 4: CERP Test Report #RE2000084 CO (6/15/2003), Table 3
Note 5: Equipment hourly capacity
Note 6: 1/4 of the requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
20,000 Tons/Year Note 6

Flow Diagram Designation
Induction Furnace #3
EU09

Maximum Hourly Capacity
10.00 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Induction Furnace #3
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #3									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.23	1.39	0.01	
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	9.000	8.600	8.460			2.341	13.944	0.140	
	Annual (TPY)	**9.000**	**8.600**	**8.460**			**2.341**	**13.944**	**0.140**	
Total Emission Rate:										
	Hourly (lb/hr)	9.000	8.600	8.460			2.341	13.944	0.140	
	Annual (TPY)	**9.000**	**8.600**	**8.460**			**2.341**	**13.944**	**0.140**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: Based on upper 95th% Confidence Interval of 2020 and 2024 CU01_ST02 stack test results; considering other units vented to this stack
Note 4: CERP Test Report #RE2000084 CO (6/15/2003), Table 3
Note 5: Equipment hourly capacity
Note 6: 1/4 of the requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #3

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
20,000 Tons/Year Note 6

Flow Diagram Designation
Induction Furnace #4
EU10

Maximum Hourly Capacity
10.00 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Induction Furnace #4
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #4									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.23	1.39	0.01	
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	9.000	8.600	8.460			2.341	13.944	0.140	
	Annual (TPY)	**9.000**	**8.600**	**8.460**			**2.341**	**13.944**	**0.140**	
Total Emission Rate:										
	Hourly (lb/hr)	9.000	8.600	8.460			2.341	13.944	0.140	
	Annual (TPY)	**9.000**	**8.600**	**8.460**			**2.341**	**13.944**	**0.140**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: Based on upper 95th% Confidence Interval of 2020 and 2024 CU01_ST02 stack test results; considering other units vented to this stack
Note 4: CERP Test Report #RE2000084 CO (6/15/2003), Table 3
Note 5: Equipment hourly capacity
Note 6: 1/4 of the requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #4

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 4

Flow Diagram Designation
Hot Metal Transfer
EU13

Maximum Hourly Capacity
15.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Hot Metal Transfer
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:	**Criteria Pollutants**								
Hot Metal Transfer									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	0.056	0.052	0.046						
(source)	Note 1	Note 2	Note 2						
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)	0.840	0.773	0.689						
Annual (TPY)	**2.240**	**2.061**	**1.837**						
Total Emission Rate:									
Hourly (lb/hr)	0.840	0.773	0.689						
Annual (TPY)	**2.240**	**2.061**	**1.837**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Hot metal transfer at building monitor. AP-42, Ch. 12-5, Table 12.5-1
Note 2: Emission factor based on USEPA PM Calculator $PM/PM_{10}/PM_{2.5}$ ratio and uncontrolled PM emission factor for SCC 30400320
Note 3: Hourly capacity based on potential Pouring (EU50) throughput rate
Note 4: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Hot Metal Transfer

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
24.99 MMCF/Year Note 3

Flow Diagram Designation
Pouring Furnace #1
EU15

Maximum Hourly Capacity
0.0029 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Pouring Furnace #1
Control Device: Melt Baghouse (CU01) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Pouring Furnace #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.022	0.022	0.022	0.002	0.285	0.016	0.240	1.43E-06	342.353
	Annual (TPY)		**0.095**	**0.095**	**0.095**	**0.007**	**1.250**	**0.069**	**1.050**	**6.25E-06**	**1499.506**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.022	0.022	0.022	0.002	0.285	0.016	0.240	1.43E-06	342.353
	Annual (TPY)		**0.095**	**0.095**	**0.095**	**0.007**	**1.250**	**0.069**	**1.050**	**6.25E-06**	**1499.506**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 2.91 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Pouring Furnace #1

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			5.71E-07	2.50E-06	**5.71E-07**	**2.50E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			3.42E-08	1.50E-07	**3.42E-08**	**1.50E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			3.14E-06	1.37E-05	**3.14E-06**	**1.37E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			3.99E-06	1.75E-05	**3.99E-06**	**1.75E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			2.40E-07	1.05E-06	**2.40E-07**	**1.05E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			1.08E-06	4.75E-06	**1.08E-06**	**4.75E-06**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			7.42E-07	3.25E-06	**7.42E-07**	**3.25E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			5.99E-06	2.62E-05	**5.99E-06**	**2.62E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			6.85E-08	3.00E-07	**6.85E-08**	**3.00E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			6.85E-09	3.00E-08	**6.85E-09**	**3.00E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			5.99E-06	2.62E-05	**5.99E-06**	**2.62E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			3.42E-06	1.50E-05	**3.42E-06**	**1.50E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			2.14E-04	9.37E-04	**2.14E-04**	**9.37E-04**	Note 1
Hexane	110-54-3	1.80E+00			5.14E-03	2.25E-02	**5.14E-03**	**2.25E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			1.74E-06	7.62E-06	**1.74E-06**	**7.62E-06**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			9.70E-06	4.25E-05	**9.70E-06**	**4.25E-05**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			6.85E-08	3.00E-07	**6.85E-08**	**3.00E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			4.56E-08	2.00E-07	**4.56E-08**	**2.00E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			3.42E-09	1.50E-08	**3.42E-09**	**1.50E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			3.42E-09	1.50E-08	**3.42E-09**	**1.50E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			3.42E-09	1.50E-08	**3.42E-09**	**1.50E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			8.56E-09	3.75E-08	**8.56E-09**	**3.75E-08**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			7.99E-09	3.50E-08	**7.99E-09**	**3.50E-08**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			4.85E-08	2.12E-07	**4.85E-08**	**2.12E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			1.43E-08	6.25E-08	**1.43E-08**	**6.25E-08**	Note 1,3
	Total HAPs				5.39E-03	2.36E-02	**5.39E-03**	**2.36E-02**	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,323 Tons/Year Note 3

Flow Diagram Designation
Melt and Core/Mold Baghouse Dust Silo
EU17

Maximum Hourly Capacity
0.38 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Melt and Core/Mold Baghouse Dust Silo
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Melt and Core/Mold Baghouse Dust Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	0.091	0.091	0.091						
	Annual (TPY)	0.399	0.399	0.399						
Total Emission Rate:										
	Hourly (lb/hr)	0.091	0.091	0.091						
	Annual (TPY)	0.399	0.399	0.399						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: In uncontrolled scenario this unit would not be necessary.

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Melt and Core/Mold Baghouse Dust Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
17.18 MMCF/Year Note 3

Flow Diagram Designation
Refractory Curing Mobile Burner
EU18

Maximum Hourly Capacity
0.002 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Refractory Curing Mobile Burner
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Refractory Curing Mobile Burner										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.015	0.015	0.015	0.001	0.196	0.011	0.165	9.80E-07	235.294
	Annual (TPY)		**0.065**	**0.065**	**0.065**	**0.005**	**0.859**	**0.047**	**0.721**	**0.000**	**1030.588**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.015	0.015	0.015	0.001	0.196	0.011	0.165	9.80E-07	235.294
	Annual (TPY)		**0.065**	**0.065**	**0.065**	**0.005**	**0.859**	**0.047**	**0.721**	**4.29E-06**	**1030.588**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 2.0 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Refractory Curing Mobile Burner

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			3.92E-07	1.72E-06	**3.92E-07**	**1.72E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			2.35E-08	1.03E-07	**2.35E-08**	**1.03E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			2.16E-06	9.45E-06	**2.16E-06**	**9.45E-06**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			2.75E-06	1.20E-05	**2.75E-06**	**1.20E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			1.65E-07	7.21E-07	**1.65E-07**	**7.21E-07**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			7.45E-07	3.26E-06	**7.45E-07**	**3.26E-06**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			5.10E-07	2.23E-06	**5.10E-07**	**2.23E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			4.12E-06	1.80E-05	**4.12E-06**	**1.80E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			4.71E-08	2.06E-07	**4.71E-08**	**2.06E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			3.53E-09	1.55E-08	**3.53E-09**	**1.55E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			3.53E-09	1.55E-08	**3.53E-09**	**1.55E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			4.12E-06	1.80E-05	**4.12E-06**	**1.80E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			2.35E-06	1.03E-05	**2.35E-06**	**1.03E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			1.47E-04	6.44E-04	**1.47E-04**	**6.44E-04**	Note 1
Hexane	110-54-3	1.80E+00			3.53E-03	1.55E-02	**3.53E-03**	**1.55E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			1.20E-06	5.24E-06	**1.20E-06**	**5.24E-06**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			6.67E-06	2.92E-05	**6.67E-06**	**2.92E-05**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05							
3-Methylchloranthrene (POM)	56-49-5	1.80E-06							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05							
Benz(a)anthracene (POM)	56-55-3	1.80E-06							
Benzo(a)pyrene (POM)	50-32-8	1.20E-06							
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06							
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06							
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06							
Chrysene (POM)	218-01-9	1.80E-06							
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06							
Fluoranthene (POM)	206-44-0	3.00E-06							
Fluorene (POM)	86-73-7	2.80E-06							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06							
Phenanathrene (POM)	85-01-8	1.70E-05							
Pyrene (POM)	129-00-0	5.00E-06							
	Total HAPs				3.70E-03	1.62E-02	**3.70E-03**	**1.62E-02**	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
21,000 Tons/Year Note 4

Flow Diagram Designation
Mold Silica Sand Silo
EU19

Maximum Hourly Capacity
25.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Mold Silica Sand Silo
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Mold Silica Sand Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	6.000	6.000	6.000						
	Annual (TPY)	**2.520**	**2.520**	**2.520**						
Total Emission Rate:										
	Hourly (lb/hr)	6.000	6.000	6.000						
	Annual (TPY)	**2.520**	**2.520**	**2.520**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Silica Sand Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
5,500 Tons/Year Note 4

Flow Diagram Designation
Blend Silo
EU20

Maximum Hourly Capacity
25.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Blend Silo
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
Blend Silo										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)		6.000	6.000	6.000						
Annual (TPY)		**0.660**	**0.660**	**0.660**						
Total Emission Rate:										
Hourly (lb/hr)		6.000	6.000	6.000						
Annual (TPY)		**0.660**	**0.660**	**0.660**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Blend Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,500 Tons/Year Note 4

Flow Diagram Designation
Bentonite Silo
EU21

Maximum Hourly Capacity
25.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Bentonite Silo
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Bentonite Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	6.000	6.000	6.000						
	Annual (TPY)	**0.420**	**0.420**	**0.420**						
Total Emission Rate:										
	Hourly (lb/hr)	6.000	6.000	6.000						
	Annual (TPY)	**0.420**	**0.420**	**0.420**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Bentonite Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
716,760 Tons/Year Note 4

Flow Diagram Designation
Mold Sand Handling and Preparation
EU22

Maximum Hourly Capacity
198.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Mold Sand Handling and Preparation
Control Device: Note 3
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Mold Sand Handling and Preparation										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	3.60	0.54	0.54						
(source)			Note 1	Note 1	Note 2						
		Capture Efficiency									
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)		712.800	106.920	106.920						
	Annual (TPY)		**1290.168**	**193.525**	**193.525**						
Total Emission Rate:											
	Hourly (lb/hr)		712.800	106.920	106.920						
	Annual (TPY)		**1290.168**	**193.525**	**193.525**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-50
Note 2: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 3: Hourly equipment capacity
Note 4: Requested maximum tons of sand processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Sand Handling and Preparation

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Annual Actual Throughput
80,000 Tons/Year Note 4

Flow Diagram Designation
Mold Making #1
EU33

Hourly Actual Throughput
15.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Mold Making #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		Criteria Pollutants								
	Mold Making #1									
Emission Factor Basis:		PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:		0.04	0.04	0.04						
(source)		Note 1	Note 2	Note 2			Note 4			
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	0.600	0.600	0.600						
	Annual (TPY)	**1.600**	**1.600**	**1.600**						
Total Emission Rate:										
	Hourly (lb/hr)	0.600	0.600	0.600						
	Annual (TPY)	**1.600**	**1.600**	**1.600**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio RACM, Table 2.7-1
Note 2: PM_{10} and $PM_{2.5}$ assumed equal to PM.
Note 3: Hourly capacity | Hourly capacity based on potential Pouring (EU50) throughput rate
Note 4: Requested maxi | Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Making #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,345 Tons/Year Note 4

Flow Diagram Designation
Core Silica Sand Silo A
EU35A

Maximum Hourly Capacity
25.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Core Silica Sand Silo A
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Core Silica Sand Silo A									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	6.000	6.000	6.000						
	Annual (TPY)	**0.401**	**0.401**	**0.401**						
Total Emission Rate:										
	Hourly (lb/hr)	6.000	6.000	6.000						
	Annual (TPY)	**0.401**	**0.401**	**0.401**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Silica Sand Silo A

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,345 Tons/Year Note 4

Flow Diagram Designation
Core Silica Sand Silo B
EU35B

Maximum Hourly Capacity
25.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Core Silica Sand Silo B
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Core Silica Sand Silo B									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	6.000	6.000	6.000						
	Annual (TPY)	**0.401**	**0.401**	**0.401**						
Total Emission Rate:										
	Hourly (lb/hr)	6.000	6.000	6.000						
	Annual (TPY)	**0.401**	**0.401**	**0.401**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-40
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Silica Sand Silo B

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
6,690 Tons/Year Note 5

Flow Diagram Designation
Core Sand Handling and Preparation
EU36

Maximum Hourly Capacity
1.86 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Core Sand Handling and Preparation
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Core Sand Handling and Preparation										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.65	0.54	0.54						
(source)			Note 1	Note 2	Note 3						
		Capture Efficiency									
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)		1.209	1.004	1.004						
	Annual (TPY)		**2.174**	**1.806**	**1.806**						
Total Emission Rate:											
	Hourly (lb/hr)		1.209	1.004	1.004						
	Annual (TPY)		**2.174**	**1.806**	**1.806**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AIRS Facility Subsystem SCC and EF Listing (EPA 450/4-90-003, March 1990)
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-50
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Hourly capacity based on potential core machines throughput rate
Note 5: Annual capacity based on potentail core machines throughput rate

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Sand Handling and Preparation

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

	Maximum Yearly Sand Capacity		Maximum Yearly Resin Capacity	
	3,345 Tons/Year	Note 7	40 Tons/Year	Note 3,7
Flow Diagram Designation	Maximum Hourly Sand Capacity		Maximum Hourly Resin Capacity	
PUCB Core Machine #1(Resin)	0.93 Tons/Hour	Note 6	22.20 Lbs/Hour	Note 3
EU39				

Process Description:

Fritz Winter North America, LP
PUCB Core Machine #1(Resin)
Control Device: Note 5
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #1(Resin)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton sand	0.30	0.30	0.30			0.0047			
(source)		Note 1	Note 8	Note 8			Note 2,3,4			
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	0.278	0.278	0.278			0.104			
	Annual (TPY)	**0.502**	**0.502**	**0.502**			**0.189**			
Total Emission Rate:										
	Hourly (lb/hr)	0.278	0.278	0.278			0.104			
	Annual (TPY)	**0.502**	**0.502**	**0.502**			**0.189**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 2: Resin VOC EF at ST09: ASK Chemicals Vendor Test, June 2025, After Mixing (0.17g loss/36g resin total = 0.0047 lb/lb resin)
Note 3: ASK Chemicals Vendor Test based on 1.2% resin (based on sand); identical maximum rate used by FWNA
Note 4: Emission factor based on lb per lb resin
Note 5: VOC emissions are captured and exhausted to Core/Mold Baghouse (CU08)
Note 6: Hourly equipment capacity
Note 7: Requested rolling 12-month rolling processing rate
Note 8: Assumes PM_{10} and $PM_{2.5}$ equivalent to PM

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1(Resin)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	0.0034	3.15E-03	5.69E-03			**3.15E-03**	**5.69E-03**	Note 8
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0221	2.04E-02	3.70E-02			**2.04E-02**	**3.70E-02**	Note 8
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0138	1.28E-02	2.31E-02			**1.28E-02**	**2.31E-02**	Note 8
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs		3.64E-02	6.57E-02			3.64E-02	6.57E-02	

Note 8: CERP Report (Tecknikon #1409-123-EQ) December 2002, Table 3-2

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

	Maximum Yearly Sand Capacity	Maximum Yearly Resin Capacity	Maximum Yearly Catalyst Capacity
	3,345 Tons/Year	40 Tons/Year Note 4,8	6.02 Tons/Year Note 5,8
Flow Diagram Designation	Maximum Hourly Sand Capacity	Maximum Hourly Resin Capacity	Maximum Hourly Catalyst Capacity
PUCB Core Machine #1(Resin+Cat)	0.93 Tons/Hour	22.20 Lbs/Hour Note 4	3.33 Lbs/Hour Note 5
EU39			

Process Description:

Fritz Winter North America, LP
PUCB Core Machine #1(Resin+Cat)
Control Device: Note 6
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		Criteria Pollutants								
	PUCB Core Machine #1(Resin+Cat)									
Emission Factor Basis:		PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:	lb/ton sand	0.35	0.35	0.35			0.3860			
(source)		Note 9	Note 10	Note 10			Note 1,2,3			
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
	d									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	0.324	0.324	0.324			8.569			
	Annual (TPY)	**0.585**	**0.585**	**0.585**			**15.494**			
Total Emission Rate:										
	Hourly (lb/hr)	0.324	0.324	0.324			8.569			
	Annual (TPY)	**0.585**	**0.585**	**0.585**			**15.494**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ASK Chemicals Vendor Test, June 2025, 30 Mins and After (1.02g-0.17g)/36g)=0.0236 g/g binder, for 1.2% Resin Focus 109/209 system
Note 2: Catalyst usage based on 15% of resin; Catalyst 100% emitted
3.33/22.22=0.150 lb/lb resin
Note 3: Emission Factor - 0.236 + 0.150 = 0.386; Emissions are on a lb/lb resin basis
Note 4: ASK Chemicals Vendor Test based on 1.2% resin (based on sand); identical maximum rate used by FWNA
Note 5: Maximimum catalyst usage is 15% of resin
Note 6: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)
Note 7: Hourly sand processing rate based on equipment capacity
Note 8: Requested rolling 12-month rolling processing rate
Note 9: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 10: Assume PM_{10} and $PM_{2.5}$ is equal to PM

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1(Resin+Cat)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Core Release Capacity
7.7 Tons/Year Note 3

Flow Diagram Designation
PUCB Core Machine #1 (Core Release)
EU39

Maximum Hourly Core Release Capacity
0.0021 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #1 (Core Release)
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #1 (Core Release)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton						1700.000			
(source)							Note 1,2			
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			
Total Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ACMOS 118-63 Core Release (84% VOC by weight per SDS and 1/3/2022 email)
HA NIxStix CB/NB Fast Dry (85% VOC per J. Krause 1/3/2022 email)
Note 2: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)
Note 3: Requested rolling 12-month rolling processing rate

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1 (Core Release)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity: 3,345 Tons/Year Note 7

Maximum Yearly Resin Capacity: 40 Tons/Year Note 3,7

Flow Diagram Designation
PUCB Core Machine #1(Resin)
EU39

Maximum Hourly Sand Capacity: 0.93 Tons/Hour Note 6

Maximum Hourly Resin Capacity: 22.20 Lbs/Hour Note 3

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #1(Resin)
Control Device: Note 5
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #1(Resin)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton sand	0.30	0.30	0.30			0.0047			
(source)		Note 1	Note 8	Note 8			Note 2,3,4			
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	0.278	0.278	0.278			0.104			
	Annual (TPY)	**0.502**	**0.502**	**0.502**			**0.189**			
Total Emission Rate:										
	Hourly (lb/hr)	0.278	0.278	0.278			0.104			
	Annual (TPY)	**0.502**	**0.502**	**0.502**			**0.189**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 2: Resin VOC EF at ST09: ASK Chemicals Vendor Test, June 2025, After Mixing (0.17g loss/36g resin total = 0.0047 lb/lb resin)
Note 3: ASK Chemicals Vendor Test based on 1.2% resin (based on sand); identical maximum rate used by FWNA
Note 4: Emission factor based on lb per lb resin
Note 5: VOC emissions are captured and exhausted to Mold/Core Baghouse (CU08)
Note 6: Hourly equipment capacity
Note 7: Requested rolling 12-month rolling processing rate
Note 8: Assumes PM_{10} and $PM_{2.5}$ equivalent to PM

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1(Resin)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	0.0034	3.15E-03	5.69E-03			**3.15E-03**	**5.69E-03**	Note 8
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0221	2.04E-02	3.70E-02			**2.04E-02**	**3.70E-02**	Note 8
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0138	1.28E-02	2.31E-02			**1.28E-02**	**2.31E-02**	Note 8
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs		3.64E-02	6.57E-02			3.64E-02	6.57E-02	

Note 8: CERP Report (Tecknikon #1409-123-EQ) December 2002, Table 3-2

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

	Maximum Yearly Sand Capacity	Maximum Yearly Resin Capacity	Maximum Yearly Catalyst Capacity
	3,345 Tons/Year	40 Tons/Year Note 4,8	6.02 Tons/Year Note 5,8
Flow Diagram Designation	Maximum Hourly Sand Capacity	Maximum Hourly Resin Capacity	Maximum Hourly Catalyst Capacity
PUCB Core Machine #1(Resin+Cat)	0.93 Tons/Hour	22.20 Lbs/Hour Note 4	3.33 Lbs/Hour Note 5
EU39			

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #1(Resin+Cat)
Control Device: Note 6
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		Criteria Pollutants								
	PUCB Core Machine #1(Resin+Cat)									
Emission Factor Basis:		PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:	lb/ton sand	0.35	0.35	0.35			0.3860			
(source)							Note 1,2,3			
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
	d									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	0.324	0.324	0.324			8.569			
	Annual (TPY)	**0.585**	**0.585**	**0.585**			**15.494**			
Total Emission Rate:										
	Hourly (lb/hr)	0.324	0.324	0.324			8.569			
	Annual (TPY)	**0.585**	**0.585**	**0.585**			**15.494**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ASK Chemicals Vendor Test, June 2025, 30 Mins and After (1.02g-0.17g)/36g)=0.0236 g/g binder, for 1.2% Resin Focus 109/209 system
Note 2: Catalyst usage based on 15% of resin; Catalyst 100% emitted
3.33/22.22=0.150 lb/lb resin
Note 3: Emission Factor - 0.236 + 0.150 = 0.386; Emissions are on a lb/lb resin basis
Note 4: ASK Chemicals Vendor Test based on 1.2% resin (based on sand); identical maximum rate used by FWNA
Note 5: Maximimum catalyst usage is 15% of resin
Note 6: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)
Note 7: Hourly sand processing rate based on equipment capacity
Note 8: Requested rolling 12-month rolling processing rate

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1(Resin+Cat)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Core Release Capacity
7.7 Tons/Year Note 3

Flow Diagram Designation
PUCB Core Machine #1 (Core Release)
EU39

Maximum Hourly Core Release Capacity
0.0021 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #1 (Core Release)
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #1 (Core Release)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton						1700.000			
(source)							Note 1,2			
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			
Total Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ACMOS 118-63 Core Release (84% VOC by weight per SDS and 1/3/2022 email)
HA NIxStix CB/NB Fast Dry (85% VOC per J. Krause 1/3/2022 email)
Note 2: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)
Note 3: Requested rolling 12-month rolling processing rate

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1 (Core Release)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
135.0 Tons/Year Note 1

Flow Diagram Designation
Core Wash Station #1
EU43

Maximum Hourly Sand Capacity
0.338 Tons/Hour Note 1

Process Description:
Fritz Winter North America, LP
Core Wash Station #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Core Wash Station #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						0.10%			
(source)							Note 2			
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)							0.675			
Annual (TPY)							**0.135**			
Total Emission Rate:										
Hourly (lb/hr)							0.675			
Annual (TPY)							**0.135**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Usage from original permit application
Note 2: VOC Content of product per supplier (0.1% VOC), Kerntop WV 031 111

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Wash Station #1

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
34.35 MMCF/Year Note 3

Flow Diagram Designation
Core Dryer #1
EU44

Maximum Hourly Capacity
0.004 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Core Dryer #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			Criteria Pollutants								
	Core Dryer #1										
Emission Factor Basis:			PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.030	0.030	0.030	0.002	0.392	0.022	0.329	1.96E-06	470.588
	Annual (TPY)		**0.131**	**0.131**	**0.131**	**0.010**	**1.718**	**0.094**	**1.443**	**8.59E-06**	**2061.176**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.030	0.030	0.030	0.002	0.392	0.022	0.329	1.96E-06	470.588
	Annual (TPY)		**0.131**	**0.131**	**0.131**	**0.010**	**1.718**	**0.094**	**1.443**	**8.59E-06**	**2061.176**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 4.0 MMBtu/hr natural-gas fired burner; 1020 But/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Core Dryer #1

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			7.84E-07	3.44E-06	**7.84E-07**	**3.44E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			4.71E-08	2.06E-07	**4.71E-08**	**2.06E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			4.31E-06	1.89E-05	**4.31E-06**	**1.89E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			5.49E-06	2.40E-05	**5.49E-06**	**2.40E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			3.29E-07	1.44E-06	**3.29E-07**	**1.44E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			1.49E-06	6.53E-06	**1.49E-06**	**6.53E-06**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			1.02E-06	4.47E-06	**1.02E-06**	**4.47E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			8.24E-06	3.61E-05	**8.24E-06**	**3.61E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			9.41E-08	4.12E-07	**9.41E-08**	**4.12E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			9.41E-09	4.12E-08	**9.41E-09**	**4.12E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			8.24E-06	3.61E-05	**8.24E-06**	**3.61E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			4.71E-06	2.06E-05	**4.71E-06**	**2.06E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			2.94E-04	1.29E-03	**2.94E-04**	**1.29E-03**	Note 1
Hexane	110-54-3	1.80E+00			7.06E-03	3.09E-02	**7.06E-03**	**3.09E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			2.39E-06	1.05E-05	**2.39E-06**	**1.05E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			1.33E-05	5.84E-05	**1.33E-05**	**5.84E-05**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			9.41E-08	4.12E-07	**9.41E-08**	**4.12E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			6.27E-08	2.75E-07	**6.27E-08**	**2.75E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			1.18E-08	5.15E-08	**1.18E-08**	**5.15E-08**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			1.10E-08	4.81E-08	**1.10E-08**	**4.81E-08**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			6.67E-08	2.92E-07	**6.67E-08**	**2.92E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			1.96E-08	8.59E-08	**1.96E-08**	**8.59E-08**	Note 1,3
Total HAPs					7.40E-03	3.24E-02	**7.40E-03**	**3.24E-02**	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.l)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
34.35 MMCF/Year Note 3

Flow Diagram Designation
Core Dryer #2
EU45

Maximum Hourly Capacity
0.004 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Core Dryer #2
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Core Dryer #2										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.030	0.030	0.030	0.002	0.392	0.022	0.329	1.96E-06	470.588
	Annual (TPY)		**0.131**	**0.131**	**0.131**	**0.010**	**1.718**	**0.094**	**1.443**	**8.59E-06**	**2061.176**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.030	0.030	0.030	0.002	0.392	0.022	0.329	1.96E-06	470.588
	Annual (TPY)		**0.131**	**0.131**	**0.131**	**0.010**	**1.718**	**0.094**	**1.443**	**8.59E-06**	**2061.176**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 4.0 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Core Dryer #2

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			7.84E-07	3.44E-06	**7.84E-07**	**3.44E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			4.71E-08	2.06E-07	**4.71E-08**	**2.06E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			4.31E-06	1.89E-05	**4.31E-06**	**1.89E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			5.49E-06	2.40E-05	**5.49E-06**	**2.40E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			3.29E-07	1.44E-06	**3.29E-07**	**1.44E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			1.49E-06	6.53E-06	**1.49E-06**	**6.53E-06**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			1.02E-06	4.47E-06	**1.02E-06**	**4.47E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			8.24E-06	3.61E-05	**8.24E-06**	**3.61E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			9.41E-08	4.12E-07	**9.41E-08**	**4.12E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			9.41E-09	4.12E-08	**9.41E-09**	**4.12E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			8.24E-06	3.61E-05	**8.24E-06**	**3.61E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			4.71E-06	2.06E-05	**4.71E-06**	**2.06E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			2.94E-04	1.29E-03	**2.94E-04**	**1.29E-03**	Note 1
Hexane	110-54-3	1.80E+00			7.06E-03	3.09E-02	**7.06E-03**	**3.09E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			2.39E-06	1.05E-05	**2.39E-06**	**1.05E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			1.33E-05	5.84E-05	**1.33E-05**	**5.84E-05**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			9.41E-08	4.12E-07	**9.41E-08**	**4.12E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			6.27E-08	2.75E-07	**6.27E-08**	**2.75E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			1.18E-08	5.15E-08	**1.18E-08**	**5.15E-08**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			1.10E-08	4.81E-08	**1.10E-08**	**4.81E-08**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			6.67E-08	2.92E-07	**6.67E-08**	**2.92E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			1.96E-08	8.59E-08	**1.96E-08**	**8.59E-08**	Note 1,3
Total HAPs					7.40E-03	3.24E-02	**7.40E-03**	**3.24E-02**	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.l)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 7

Flow Diagram Designation
Pouring #1
EU50

Maximum Hourly Capacity
15.00 Tons/Hour Note 6

Process Description:
Fritz Winter North America, LP
Pouring #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Pouring #1										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.410	0.410	0.336	0.020	0.010	3.540	6.166	4.79E-04	
(source)		Note 1	Note 1	Note 5	Note 2	Note 2	Note 4	Note 4	Note 3	
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	6.150	6.150	5.043	0.300	0.150	53.101	92.488	7.19E-03	
	Annual (TPY)	**16.400**	**16.400**	**13.448**	**0.800**	**0.400**	**141.604**	**246.634**	**1.92E-02**	
Total Emission Rate:										
	Hourly (lb/hr)	6.150	6.150	5.043	0.300	0.150	53.101	92.488	7.19E-03	
	Annual (TPY)	**16.400**	**16.400**	**13.448**	**0.800**	**0.400**	**141.604**	**246.634**	**1.92E-02**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Stack test at Quality Castings, Orrville, OH.
Note 2: WebFIRE (Aug 20, 2021) SCC 30400320
Note 3: Emission factors taken from the document entitled "Foundry Process Emission Factors: Baseline Emissions from Automotive Foundries in Mexico"; (CERP-Mexico); Table 5.12
Note 4: Based on upper 95th% Confidence Interval of 2019 and 2024 CU08/ST09 stack test results; considering other units vented to this stack
Note 5: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 6: Hourly equipment capacity
Note 7: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (E
Maximum Stack Emissions Rate (lb/hr) {SOx,NOx, VOC, CO} =(Max. Rated Capa
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of ope
Maximum Annual (ton/yr) SOx NOx, VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year

Flow Diagram Designation
Mold Cooling
EU52

Maximum Hourly Capacity
15.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Mold Cooling
Control Device: Note 2
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Mold Cooling										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton									
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency									
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emissions are combined with pouring. See Pouring #1 (EU50) worksheet.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (E
Maximum Stack Emissions Rate (lb/hr) {SOx,NOx, VOC, CO} =(Max. Rated Capa
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of ope
Maximum Annual (ton/yr) SOx NOx, VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Cooling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 4

Flow Diagram Designation
Shakeout Conveyor
EU53

Maximum Hourly Capacity
15.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Shakeout Conveyor
Control Device:
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Shakeout Conveyor										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	3.20	2.24	1.34			0.616	0.515		
(source)			Note 1	Note 1	Note 1			Note 2	Note 2		
		Capture Efficiency									
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)		48.000	33.600	20.102			9.240	7.725		
	Annual (TPY)		**128.000**	**89.600**	**53.606**			**24.640**	**20.600**		
Total Emission Rate:											
	Hourly (lb/hr)		48.000	33.600	20.102			9.240	7.725		
	Annual (TPY)		**128.000**	**89.600**	**53.606**			**24.640**	**20.600**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: WebFire SCC 30400318 (4/15/2021)
Note 2: Based on upper 95th% Confidence Interval of 2018, 2020 and 2024 CU06/ST07 stack test results; considering other units vented to this stack
Note 3: Hourly equipment capacity
Note 4: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Shakeout Conveyor

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,323 Tons/Year Note 3

Flow Diagram Designation
Sand Plant Waste Sand Silo
EU57

Maximum Hourly Capacity
0.38 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Sand Plant Waste Sand Silo
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Sand Plant Waste Sand Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	0.091	0.091	0.091						
	Annual (TPY)	0.399	0.399	0.399						
Total Emission Rate:										
	Hourly (lb/hr)	0.091	0.091	0.091						
	Annual (TPY)	0.399	0.399	0.399						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: In uncontrolled scenario this unit would not be necessary.

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Sand Plant Waste Sand Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 3

Flow Diagram Designation
Casting Cooling
EU59

Maximum Hourly Capacity
15.00 Tons/Hour Note 2

Process Description:
Fritz Winter North America, LP
Casting Cooling
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			Criteria Pollutants								
	Casting Cooling										
Emission Factor Basis:			PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:		lb/ton	0.032	0.022	0.013						
(source)			Note 1	Note 1	Note 1						
		Capture Efficiency									
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)		0.480	0.336	0.201						
	Annual (TPY)		**1.280**	**0.896**	**0.536**						
Total Emission Rate:											
	Hourly (lb/hr)		0.480	0.336	0.201						
	Annual (TPY)		**1.280**	**0.896**	**0.536**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: 1.0% of emission factor from FIRE 6.25 SCC 3-04-003-31
Note 2: Hourly equipment capacity
Note 3: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Casting Cooling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 3

Flow Diagram Designation
Sorting Conveyor
EU60

Maximum Hourly Capacity
15.00 Tons/Hour Note 2

Process Description:
Fritz Winter North America, LP
Sorting Conveyor
Control Device:
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Sorting Conveyor										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.016	0.011	0.007						
(source)			Note 1	Note 1	Note 1						
		Capture Efficiency									
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)		0.240	0.168	0.101						
	Annual (TPY)		**0.640**	**0.448**	**0.268**						
Total Emission Rate:											
	Hourly (lb/hr)		0.240	0.168	0.101						
	Annual (TPY)		**0.640**	**0.448**	**0.268**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: 0.5% of emission factor from FIRE 6.25 SCC 3-04-003-31
Note 2: Hourly equipment capacity
Note 3: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Sorting Conveyor

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 5

Flow Diagram Designation
Steel Shot Blasting #1
EU61

Maximum Hourly Capacity
15.00 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Steel Shot Blasting #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Steel Shot Blasting #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	15.50	1.70	1.70						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	232.500	25.500	25.500						
	Annual (TPY)	**620.000**	**68.000**	**68.000**						
Total Emission Rate:										
	Hourly (lb/hr)	232.500	25.500	25.500						
	Annual (TPY)	**620.000**	**68.000**	**68.000**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-40
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Hourly equipment capacity
Note 5: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Steel Shot Blasting #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,323 Tons/Year Note 3

Flow Diagram Designation
Fettling Baghouse Waste Dust Silo
EU63

Maximum Hourly Capacity
0.38 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Fettling Baghouse Waste Dust Silo
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		Criteria Pollutants								
	Fettling Baghouse Waste Dust Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	0.091	0.091	0.091						
	Annual (TPY)	0.399	0.399	0.399						
Total Emission Rate:										
	Hourly (lb/hr)	0.091	0.091	0.091						
	Annual (TPY)	0.399	0.399	0.399						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: In uncontrolled scenario this unit would not be necessary.

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Fettling Baghouse Waste Dust Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 5

Flow Diagram Designation
Auto Grinding #1
EU64

Maximum Hourly Capacity
7.50 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Auto Grinding #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Auto Grinding #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	12.000	0.034	0.034						
	Annual (TPY)	**32.000**	**0.090**	**0.090**						
Total Emission Rate:										
	Hourly (lb/hr)	12.000	0.034	0.034						
	Annual (TPY)	**32.000**	**0.090**	**0.090**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10
Note 4: Hourly equipment capacity
Note 5: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Auto Grinding #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 5

Flow Diagram Designation
Auto Grinding #1
EU64

Maximum Hourly Capacity
7.50 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Auto Grinding #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Auto Grinding #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	12.000	0.034	0.034						
	Annual (TPY)	**32.000**	**0.090**	**0.090**						
Total Emission Rate:										
	Hourly (lb/hr)	12.000	0.034	0.034						
	Annual (TPY)	**32.000**	**0.090**	**0.090**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10
Note 4: Hourly equipment capacity
Note 5: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Auto Grinding #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 5

Flow Diagram Designation
Machining Lines (9)
EU66

Maximum Hourly Capacity
15.00 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Machining Lines (9)
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		Criteria Pollutants								
Machining Lines (9)										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)		24.000	0.068	0.068						
Annual (TPY)		**64.000**	**0.180**	**0.180**						
Total Emission Rate:										
Hourly (lb/hr)		24.000	0.068	0.068						
Annual (TPY)		**64.000**	**0.180**	**0.180**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10
Note 4: Hourly equipment capacity
Note 5: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Machining Lines (9)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 5

Flow Diagram Designation
Perforation Line #2
EU67

Maximum Hourly Capacity
7.50 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Perforation Line #2
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Perforation Line #2										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)		12.000	0.034	0.034						
Annual (TPY)		**32.000**	**0.090**	**0.090**						
Total Emission Rate:										
Hourly (lb/hr)		12.000	0.034	0.034						
Annual (TPY)		**32.000**	**0.090**	**0.090**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10
Note 4: Hourly equipment capacity
Note 5: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Perforation Line #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
36.00 Tons/Year Note 4

Flow Diagram Designation
Paint Line #3 (Coating)
EU68

Maximum Hourly Capacity
9.00 Lbs/Hour Note 3

Process Description:
Fritz Winter North America, LP
Paint Line #3 (Coating)
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Paint Line #3 (Coating)										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.87	0.87	0.87			0.27			
(source)		Note 1	Note 2	Note 2			Note 5			
Capture Efficiency										
Control Efficiency										
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)		2.349	2.349	2.349			2.430			
Annual (TPY)		**9.396**	**9.396**	**9.396**			**9.720**			
Total Emission Rate:										
Hourly (lb/hr)		2.349	2.349	2.349			2.430			
Annual (TPY)		**9.396**	**9.396**	**9.396**			**9.720**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Zinc Dust Primer EDS (INMOTIQ Primer SB 1K) (density is 25.75 lb/gal)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM
Note 3: Hourly equipment capacity
Note 4: Requested maximum material processed per year per rolling 12-month basis
Note 5: 95th percentile confidence interval of highest Line 2 and 3 performance test

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #3 (Coating)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2	0.010%	9.00E-04	3.60E-03			**9.00E-04**	**3.60E-03**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8	0.060%	5.40E-03	2.16E-02			**5.40E-03**	**2.16E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.950%	8.55E-02	3.42E-01			**8.55E-02**	**3.42E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.020%	1.80E-03	7.20E-03			**1.80E-03**	**7.20E-03**	Note 1
Xylenes	1330-20-7	3.890%	3.50E-01	1.40E+00			**3.50E-01**	**1.40E+00**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs		4.44E-01	1.77E+00			4.44E-01	1.77E+00	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #3 (Coating)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6	1.81%	1.63E-01	6.52E-01			**1.63E-01**	**6.52E-01**	Note 1
Zinc (TAC)	7440-66-6								Note 3
Zinc Oxide (TAC)	1314-13-2								Note 3
n-Butyl Acetate (TAC)	123-86-4								
Solvent Naphtha (TAC)	64742-95-6								
1-Butanol (TAC)	71-36-3								
Mesitylene (TAC)	108-67-6								
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								
Other Air Toxics			1.63E-01	6.52E-01					

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
4.00 Tons/Year Note 3

Flow Diagram Designation
Paint Line #3 (Thinner)
EU68

Maximum Hourly Capacity
1.00 Lbs/Hour Note 2

Process Description:
Fritz Winter North America, LP
Paint Line #3 (Thinner)
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #3 (Thinner)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb						1.00			
(source)							Note 1			
Capture Efficiency										
Control Efficiency										
Transfer Efficiency										
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)							1.000			
Annual (TPY)							**4.000**			
Total Emission Rate:										
Hourly (lb/hr)							1.000			
Annual (TPY)							**4.000**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Reducing Solvent Blend for WG102992 TDS (Thinner Density is 7.26 lb/gal)
Note 2: Hourly equipment capacity
Note 3: Requested maximum material processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #3 (Thinner)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8	0.54%	5.37E-03	2.15E-02			**5.37E-03**	**2.15E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	3.30%	3.30E-02	1.32E-01			**3.30E-02**	**1.32E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7	6.19%	6.19E-02	2.48E-01			**6.19E-02**	**2.48E-01**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs		1.00E-01	4.01E-01			1.00E-01	4.01E-01	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #3 (Thinner)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6								
Zinc (TAC)	7440-66-6								
Zinc Oxide (TAC)	1314-13-2								
n-Butyl Acetate (TAC)	123-86-4	51.59%	5.16E-01	2.06E+00			**5.16E-01**	**2.06E+00**	Note 1
Solvent Naphtha (TAC)	64742-95-6	14.44%	1.44E-01	5.78E-01			**1.44E-01**	**5.78E-01**	Note 1
1-Butanol (TAC)	71-36-3	6.19%	6.19E-02	2.48E-01			**6.19E-02**	**2.48E-01**	Note 1
Mesitylene (TAC)	108-67-6	3.30%	3.30E-02	1.32E-01			**3.30E-02**	**1.32E-01**	Note 1
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								
Other Air Toxics			7.55E-01	3.02E+00					

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
36.00 Tons/Year Note 4

Flow Diagram Designation
Paint Line #2(Coating)
EU69

Maximum Hourly Capacity
9.00 Lbs/Hour Note 3

Process Description:
Fritz Winter North America, LP
Paint Line #2(Coating)
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #2(Coating)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.87	0.87	0.87			0.27			
(source)		Note 1	Note 2	Note 2			Note 5			
Capture Efficiency										
Control Efficiency										
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)		2.349	2.349	2.349			2.430			
Annual (TPY)		**9.396**	**9.396**	**9.396**			**9.720**			
Total Emission Rate:										
Hourly (lb/hr)		2.349	2.349	2.349			2.430			
Annual (TPY)		**9.396**	**9.396**	**9.396**			**9.720**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Zinc Dust Primer EDS (INMOTIQ Primer SB 1K) (density is 25.75 lb/gal)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM
Note 3: Hourly equipment capacity
Note 4: Requested maximum material processed per year per rolling 12-month basis
Note 5: 95th percentile confidence interval of highest Line 2 and 3 performance test

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #2(Coating)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2	0.010%	9.00E-04	3.60E-03			**9.00E-04**	**3.60E-03**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8	0.060%	5.40E-03	2.16E-02			**5.40E-03**	**2.16E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.950%	8.55E-02	3.42E-01			**8.55E-02**	**3.42E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.020%	1.80E-03	7.20E-03			**1.80E-03**	**7.20E-03**	Note 1
Xylenes	1330-20-7	3.890%	3.50E-01	1.40E+00			**3.50E-01**	**1.40E+00**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs		4.44E-01	1.77E+00			4.44E-01	1.77E+00	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #2(Coating)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6	1.81%	1.63E-01	6.52E-01			**1.63E-01**	**6.52E-01**	Note 1
Zinc (TAC)	7440-66-6								Note 3
Zinc Oxide (TAC)	1314-13-2								Note 3
n-Butyl Acetate (TAC)	123-86-4								
Solvent Naphtha (TAC)	64742-95-6								
1-Butanol (TAC)	71-36-3								
Mesitylene (TAC)	108-67-6								
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								
Other Air Toxics			1.63E-01	6.52E-01					

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
4.00 Tons/Year Note 3

Flow Diagram Designation
Paint Line #2(Thinner)
EU69

Maximum Hourly Capacity
1.00 Lbs/Hour Note 2

Process Description:
Fritz Winter North America, LP
Paint Line #2(Thinner)
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #2(Thinner)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb						1.00			
(source)							Note 1			
Capture Efficiency										
Control Efficiency										
Transfer Efficiency										
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)							1.000			
Annual (TPY)							**4.000**			
Total Emission Rate:										
Hourly (lb/hr)							1.000			
Annual (TPY)							**4.000**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Reducing Solvent Blend for WG102992 TDS (Thinner Density is 7.26 lb/gal)
Note 2: Hourly equipment capacity
Note 3: Requested maximum material processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #2(Thinner)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8	0.537%	5.37E-03	2.15E-02			**5.37E-03**	**2.15E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	3.302%	3.30E-02	1.32E-01			**3.30E-02**	**1.32E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7	6.191%	6.19E-02	2.48E-01			**6.19E-02**	**2.48E-01**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs		1.00E-01	4.01E-01			1.00E-01	4.01E-01	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #2(Thinner)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6								
Zinc (TAC)	7440-66-6								
Zinc Oxide (TAC)	1314-13-2								
n-Butyl Acetate (TAC)	123-86-4	51.59%	5.16E-01	2.06E+00			**5.16E-01**	**2.06E+00**	Note 1
Solvent Naphtha (TAC)	64742-95-6	14.44%	1.44E-01	5.78E-01			**1.44E-01**	**5.78E-01**	Note 1
1-Butanol (TAC)	71-36-3	6.19%	6.19E-02	2.48E-01			**6.19E-02**	**2.48E-01**	Note 1
Mesitylene (TAC)	108-67-6	3.30%	3.30E-02	1.32E-01			**3.30E-02**	**1.32E-01**	Note 1
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								
Other Air Toxics			7.55E-01	3.02E+00					

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
10.00 Tons/Year Note 6

Flow Diagram Designation
Paint Line #1
EU71

Maximum Hourly Capacity
5.50 Lbs/Hour Note 5

Process Description:
Fritz Winter North America, LP
Paint Line #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.41	0.41	0.41			0.180			
(source)		Note 1	Note 2	Note 2			Note 3			
Capture Efficiency										
Control Efficiency										
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)		0.677	0.677	0.677			0.992			
Annual (TPY)		**1.230**	**1.230**	**1.230**			**1.804**			
Total Emission Rate:										
Hourly (lb/hr)		0.677	0.677	0.677			0.992			
Annual (TPY)		**1.230**	**1.230**	**1.230**			**1.804**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Geomet 360 SDS (upper end of % solids range)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM
Note 3: Geomet 360 Air Quality Data Sheet (1.6 lb/gal VOC at coating density of 11.05 lbs/gal
Note 4: Above quantities and emission factors disregard DI water that is used as a thinner
Note 5: Hourly equipment capacity
Note 6: Requested maximum material processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1	3.400%	1.87E-01	3.40E-01			**1.87E-01**	**3.40E-01**	Note 3
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs		1.87E-01	3.40E-01			1.87E-01	3.40E-01	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #1

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6								
Zinc (TAC)	7440-66-6								
Zinc Oxide (TAC)	1314-13-2								
n-Butyl Acetate (TAC)	123-86-4								
Solvent Naphtha (TAC)	64742-95-6								
1-Butanol (TAC)	71-36-3								
Mesitylene (TAC)	108-67-6								
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8	1.00%	5.50E-02	1.00E-01			**5.50E-02**	**1.00E-01**	Note 5
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9	1.00%	5.50E-02	1.00E-01			**5.50E-02**	**1.00E-01**	Note 5

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
735.00 MMBtu/Year Note 4

Flow Diagram Designation
Emergency Generator #1
EU72

Maximum Hourly Capacity
7.350 MMBtu/Hour Note 3

Process Description:
McWane Plant & Industrial - Calera, AL
Emergency Generator #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Emergency Generator #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/MMBtu	0.07	0.07	0.07	1.52	3.20	0.09	0.85		165.00
(source)			Note 1,4	Note 1,4	Note 1,4	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency									
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)		0.512	0.512	0.512	11.135	23.520	0.662	6.248		1.21E+03
	Annual (TPY)		**0.026**	**0.026**	**0.026**	**0.557**	**1.176**	**0.033**	**0.312**		**6.06E+01**
Total Emission Rate:											
	Hourly (lb/hr)		0.512	0.512	0.512	11.135	23.520	0.662	6.248		1.21E+03
	Annual (TPY)		**0.026**	**0.026**	**0.026**	**0.557**	**1.176**	**0.033**	**0.312**		**6.06E+01**

POTENTIAL OPERATING SCHEDULE
2 HRS/DAY
100 HRS/YEAR

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: Maximum hourly 1050 HP; 7,000 Btu/hp-hr (AP-42 Table 3.3-1, footnote e)
Note 4: Maximum Hourly times potential operating hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Emergency Generator #1

HAP/TRI	CAS No.	Emission Factor (lb/10^6 scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	4.68E-06	3.44E-05	1.72E-06			**3.44E-05**	**1.72E-06**	Note 1,3
Acenaphthylene (POM)	208-96-8	9.23E-06	6.78E-05	3.39E-06			**6.78E-05**	**3.39E-06**	Note 1,3
Acetaldehyde	75-07-0	2.52E-05	1.85E-04	9.26E-06			**1.85E-04**	**9.26E-06**	Note 1
Acetophenone	98-86-2								
Acrolein	107-02-8	7.88E-06	5.79E-05	2.90E-06			**5.79E-05**	**2.90E-06**	Note 1,2
Aniline	62-53-3								
Anthracene (POM)	120-12-7	1.23E-06	9.04E-06	4.52E-07			**9.04E-06**	**4.52E-07**	Note 1,3
Benzene	71-43-2	7.76E-04	5.70E-03	2.85E-04			**5.70E-03**	**2.85E-04**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.89E-05	5.80E-04	2.90E-05			**5.80E-04**	**2.90E-05**	Note 1
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	1.30E-04	9.56E-04	4.78E-05			**9.56E-04**	**4.78E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	2.81E-04	2.07E-03	1.03E-04			**2.07E-03**	**1.03E-04**	Note 1
Xylenes	1330-20-7	1.93E-04	1.42E-03	7.09E-05			**1.42E-03**	**7.09E-05**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3	6.22E-07	4.57E-06	2.29E-07			**4.57E-06**	**2.29E-07**	Note 1,3
Benzo(a)pyrene (POM)	50-32-8	2.57E-07	1.89E-06	9.44E-08			**1.89E-06**	**9.44E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.11E-06	8.16E-06	4.08E-07			**8.16E-06**	**4.08E-07**	Note 1,3
Benzo(g,h,i)perylene (POM)	191-24-2	5.56E-07	4.09E-06	2.04E-07			**4.09E-06**	**2.04E-07**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	2.18E-07	1.60E-06	8.01E-08			**1.60E-06**	**8.01E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.53E-06	1.12E-05	5.62E-07			**1.12E-05**	**5.62E-07**	Note 1,3
Dibenzo(a,h)anthracene (POM)	53-70-3	3.46E-07	2.54E-06	1.27E-07			**2.54E-06**	**1.27E-07**	Note 1,2,3
Fluoranthene (POM)	206-44-0	4.03E-06	2.96E-05	1.48E-06			**2.96E-05**	**1.48E-06**	Note 1,3
Fluorene (POM)	86-73-7	1.28E-05	9.41E-05	4.70E-06			**9.41E-05**	**4.70E-06**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	4.14E-07	3.04E-06	1.52E-07			**3.04E-06**	**1.52E-07**	Note 1,2,3
Phenanathrene (POM)	85-01-8	4.08E-05	3.00E-04	1.50E-05			**3.00E-04**	**1.50E-05**	Note 1,3
Pyrene (POM)	129-00-0	3.71E-06	2.73E-05	1.36E-06			**2.73E-05**	**1.36E-06**	Note 1,3
	Total HAPs		1.16E-02	5.78E-04			**1.16E-02**	**5.78E-04**	

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
735.00 MMBtu/Year Note 4

Flow Diagram Designation
Emergency Generator #2
EU73

Maximum Hourly Capacity
7.350 MMBtu/Hour Note 3

Process Description:
McWane Plant & Industrial - Calera, AL
Emergency Generator #2
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Emergency Generator #2										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/MMBtu		0.07	0.07	0.07	1.52	3.20	0.09	0.85		165.00
(source)			Note 1,4	Note 1,4	Note 1,4	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency									
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)		0.512	0.512	0.512	11.172	23.520	0.662	6.248		1.21E+03
	Annual (TPY)		**0.026**	**0.026**	**0.026**	**0.559**	**1.176**	**0.033**	**0.312**		**6.06E+01**
Total Emission Rate:											
	Hourly (lb/hr)		0.512	0.512	0.512	11.172	23.520	0.662	6.248		1.21E+03
	Annual (TPY)		**0.026**	**0.026**	**0.026**	**0.559**	**1.176**	**0.033**	**0.312**		**6.06E+01**

POTENTIAL OPERATING SCHEDULE
2 HRS/DAY
100 HRS/YEAR

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: Maximum hourly 1050 HP; 7,000 Btu/hp-hr (AP-42 Table 3.3-1, footnote e)
Note 4: Maximum Hourly times potential operating hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Emergency Generator #2

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	4.68E-06	3.44E-05	1.72E-06			**3.44E-05**	**1.72E-06**	Note 1,3
Acenaphthylene (POM)	208-96-8	9.23E-06	6.78E-05	3.39E-06			**6.78E-05**	**3.39E-06**	Note 1,3
Acetaldehyde	75-07-0	2.52E-05	1.85E-04	9.26E-06			**1.85E-04**	**9.26E-06**	Note 1
Acetophenone	98-86-2								
Acrolein	107-02-8	7.88E-06	5.79E-05	2.90E-06			**5.79E-05**	**2.90E-06**	Note 1,2
Aniline	62-53-3								
Anthracene (POM)	120-12-7	1.23E-06	9.04E-06	4.52E-07			**9.04E-06**	**4.52E-07**	Note 1,3
Benzene	71-43-2	7.76E-04	5.70E-03	2.85E-04			**5.70E-03**	**2.85E-04**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.89E-05	5.80E-04	2.90E-05			**5.80E-04**	**2.90E-05**	Note 1
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	1.30E-04	9.56E-04	4.78E-05			**9.56E-04**	**4.78E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	2.81E-04	2.07E-03	1.03E-04			**2.07E-03**	**1.03E-04**	Note 1
Xylenes	1330-20-7	1.93E-04	1.42E-03	7.09E-05			**1.42E-03**	**7.09E-05**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3	6.22E-07	4.57E-06	2.29E-07			**4.57E-06**	**2.29E-07**	Note 1,3
Benzo(a)pyrene (POM)	50-32-8	2.57E-07	1.89E-06	9.44E-08			**1.89E-06**	**9.44E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.11E-06	8.16E-06	4.08E-07			**8.16E-06**	**4.08E-07**	Note 1,3
Benzo(g,h,i)perylene (POM)	191-24-2	5.56E-07	4.09E-06	2.04E-07			**4.09E-06**	**2.04E-07**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	2.18E-07	1.60E-06	8.01E-08			**1.60E-06**	**8.01E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.53E-06	1.12E-05	5.62E-07			**1.12E-05**	**5.62E-07**	Note 1,3
Dibenzo(a,h)anthracene (POM)	53-70-3	3.46E-07	2.54E-06	1.27E-07			**2.54E-06**	**1.27E-07**	Note 1,2,3
Fluoranthene (POM)	206-44-0	4.03E-06	2.96E-05	1.48E-06			**2.96E-05**	**1.48E-06**	Note 1,3
Fluorene (POM)	86-73-7	1.28E-05	9.41E-05	4.70E-06			**9.41E-05**	**4.70E-06**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	4.14E-07	3.04E-06	1.52E-07			**3.04E-06**	**1.52E-07**	Note 1,2,3
Phenanathrene (POM)	85-01-8	4.08E-05	3.00E-04	1.50E-05			**3.00E-04**	**1.50E-05**	Note 1,3
Pyrene (POM)	129-00-0	3.71E-06	2.73E-05	1.36E-06			**2.73E-05**	**1.36E-06**	Note 1,3
	Total HAPs		1.16E-02	5.78E-04			**1.16E-02**	**5.78E-04**	

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
39.20 MMBtu/Year Note 4

Flow Diagram Designation
Emergency Generator #3
EU74

Maximum Hourly Capacity
0.392 MMBtu/Hour Note 3

Process Description:
McWane Plant & Industrial - Calera, AL
Emergency Generator #3
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Emergency Generator #3										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/MMBtu		0.31	0.31	0.31	0.29	4.41	0.35	0.95		164.00
(source)			Note 1,4	Note 1,4	Note 1,4	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency									
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)		0.122	0.122	0.122	0.114	1.729	0.137	0.372		6.43E+01
	Annual (TPY)		**0.006**	**0.006**	**0.006**	**0.006**	**0.086**	**0.007**	**0.019**		**3.21E+00**
Total Emission Rate:											
	Hourly (lb/hr)		0.122	0.122	0.122	0.114	1.729	0.137	0.372		6.43E+01
	Annual (TPY)		**0.006**	**0.006**	**0.006**	**0.006**	**0.086**	**0.007**	**0.019**		**3.21E+00**

POTENTIAL OPERATING SCHEDULE
2 HRS/DAY
100 HRS/YEAR

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: Maximum hourly 56 HP; 7000.0 Btu/hp-hr (AP-42 Table 3.3-1, footnote e)
Note 4: Maximum Hourly times potential operating hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Emergency Generator #3

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0	3.91E-05	1.53E-05	7.66E-07			**1.53E-05**	**7.66E-07**	
Acenaphthene (POM)	83-32-9	1.42E-06	5.57E-07	2.78E-08			**5.57E-07**	**2.78E-08**	Note 1,3
Acenaphthylene (POM)	208-96-8	5.06E-06	1.98E-06	9.92E-08			**1.98E-06**	**9.92E-08**	Note 1,3
Acetaldehyde	75-07-0	7.67E-04	3.01E-04	1.50E-05			**3.01E-04**	**1.50E-05**	Note 1
Acetophenone	98-86-2								
Acrolein	107-02-8	9.25E-05	3.63E-05	1.81E-06			**3.63E-05**	**1.81E-06**	Note 1,2
Aniline	62-53-3								
Anthracene (POM)	120-12-7	1.87E-06	7.33E-07	3.67E-08			**7.33E-07**	**3.67E-08**	Note 1,3
Benzene	71-43-2	9.33E-04	3.66E-04	1.83E-05			**3.66E-04**	**1.83E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	1.18E-03	4.63E-04	2.31E-05			**4.63E-04**	**2.31E-05**	Note 1
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	8.48E-05	3.32E-05	1.66E-06			**3.32E-05**	**1.66E-06**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	4.09E-04	1.60E-04	8.02E-06			**1.60E-04**	**8.02E-06**	Note 1
Xylenes	1330-20-7	2.85E-04	1.12E-04	5.59E-06			**1.12E-04**	**5.59E-06**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3	1.68E-06	6.59E-07	3.29E-08			**6.59E-07**	**3.29E-08**	Note 1,3
Benzo(a)pyrene (POM)	50-32-8	1.88E-07	7.37E-08	3.68E-09			**7.37E-08**	**3.68E-09**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	9.91E-08	3.88E-08	1.94E-09			**3.88E-08**	**1.94E-09**	Note 1,3
Benzo(g,h,i)perylene (POM)	191-24-2	4.89E-07	1.92E-07	9.58E-09			**1.92E-07**	**9.58E-09**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.55E-07	6.08E-08	3.04E-09			**6.08E-08**	**3.04E-09**	Note 1,2,3
Chrysene (POM)	218-01-9	3.53E-07	1.38E-07	6.92E-09			**1.38E-07**	**6.92E-09**	Note 1,3
Dibenzo(a,h)anthracene (POM)	53-70-3	5.83E-07	2.29E-07	1.14E-08			**2.29E-07**	**1.14E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	7.61E-06	2.98E-06	1.49E-07			**2.98E-06**	**1.49E-07**	Note 1,3
Fluorene (POM)	86-73-7	2.92E-05	1.14E-05	5.72E-07			**1.14E-05**	**5.72E-07**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	3.75E-07	1.47E-07	7.35E-09			**1.47E-07**	**7.35E-09**	Note 1,2,3
Phenanathrene (POM)	85-01-8	2.94E-05	1.15E-05	5.76E-07			**1.15E-05**	**5.76E-07**	Note 1,3
Pyrene (POM)	129-00-0	4.78E-06	1.87E-06	9.37E-08			**1.87E-06**	**9.37E-08**	Note 1,3
	Total HAPs		1.52E-03	7.59E-05			**1.52E-03**	**7.59E-05**	

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Tank No.	Diesel Storage Tank (1000 gallon)	**Tank type**	Horizontal	**Date**		08/21/25	
Material stored	Fuel Oil No. 2 (Diesel)	**Company**	Fritz Winter North America	**Performed by**		Craig Schmeisser	
City	Franklin	**State**	KY			Mad River Strategies, LLC	
Description	Diesel Storage Tank (1000 gallon)						

INPUT DATA					CALCULATIONS				
	Reference	**Symbol**	**Values**	**Units**		**Reference**	**Symbol**		**Units**
					Breathing losses				
Molecular Weight					Tank vapor space volume	AP-42, Section 7.1, pg 7.1-16, Eq. 1-3	V_V	136.92	ft^3
Molecular weight	AP-42, Section 7.1, Table 7.1-2, pg 7.1-92	M_V	130	Lb/lb-mole	Vapor density	AP-42, Section 7.1, pg 7.1-23, Eq. 1-22	W_V	1.591E-04	lb/ft^3
Tank design data					Vapor space expansion factor	AP-42, Section 7.1, pg 7.1-20, Eq. 1-12	K_E	0.03212	Dimensionless
Shell height	See Horizontal Tank Calcs Below - Calculated	H or H_E	4.42	ft	Vented vapor saturation factor	AP-42, Section 7.1, pg 7.1-22, Eq. 1-21	K_S	0.9992	Dimensionless
Diameter	See Horizontal Tank Calcs Below - Calculated	D or D_E	8.88	ft					
Maximum liquid height	AP-42, Section 7.1, pg 7.1-28	H_{LX}	4.42	ft	**Standing Storage Loss (Breathing Loss)**	AP-42, Section 7.1, pg 7.1-16, Eq. 1-2	L_S	0.2551	lb/yr
Minimum liquid height	AP-42, Section 7.1, pg 7.1-28	H_{LN}	0.00	ft					
Vapor Space Outage	AP-42, Section 7.1, pg 7.1-21	H_{VO}	2.21	ft	**Working losses**	AP-42, Section 7.1, pg 7.1-28, Eq. 1-35	L_W	137.3876	lb/yr
Annual Sum of the increases in liquid level	AP-42, Section 7.1, pg 7.1-28, Eq. 1-37	$\sum H_{OI}$	69.07	ft/yr					
Tank Maximum Liquid Volume	AP-42, Section 7.1, pg 7.1-201, Eq. 60-4	V_{LX}	274	ft^3					
Turnovers	AP-42, Section 7.1, pg 7.1-28	N	16	Dimensionless	**TOTAL LOSSES**	Calculated	L_T	**137.6427**	lb/yr
Net throughput	Calculated @ 31.5 gals/bbl	Q	762	bbl/yr					
Turnover factor	AP-42, Section 7.1, pg 7.1-28	K_N	1.00	Dimensionless					
Working loss product factor	AP-42, Section 7.1, pg 7.1-28	K_P	1.00	Dimensionless					
Net working loss throughput	AP-42, Section 7.1, pg 7.1-29, Eq. 1-38	V_Q	4277.33	bb/yr					
Meteorological data									
Daily ave. ambient temp.	AP-42, Section 7.1, pg 7.1-26, Eq. 1-30	T_{AA}	519.85	°R					
Daily max. ambient temp.	AP-42, Section 7.1, Table 7.1-7, pg 7.1-132 Nashville, TN as location	T_{AX}	529.40	°R					
Daily min. ambient temp.	AP-42, Section 7.1, Table 7.1-7, pg 7.1-63 Nashville, TN as location	T_{AN}	510.30	°R					
Daily ambient temp. range	AP-42, Section 7.1, pg 7.1-19, Eq. 1-11	ΔT_A	19.10	°R					
Tank paint solar absorptance	AP-42, Section 7.1, Table 7.1-6, pg 7.1-102 White Tank	a	0.17	Dimensionless					
Daily total insolation factor	AP-42, Section 7.1, Table 7.1-7, pg 7.1-63 Nashville, TN as location	I	1,316	Btu/ft^2-day					
Liquid bulk temperature	AP-42, Section 7.1, pg 7.1-27, Eq. 1-31	T_B	520.52	°R					
Daily vapor temp. range	AP-42, Section 7.1, pg 7.1-18, Eq. 1-7	ΔT_V	17.84	°R					
Daily ave. liquid surface temp.	AP-42, Section 7.1, pg 7.1-26, Eq. 1-28	T_{LA}	521.37	°R					
Daily max. liquid surface temp.	AP-42, Section 7.1, pg 7.1-83, Fig. 7.1-17	T_{LX}	525.83	°R					
Daily min. liquid surface temp.	AP-42, Section 7.1, pg 7.1-83, Fig. 7.1-17	T_{LN}	516.91	°R					
Average vapor temperature	AP-42, Section 7.1, pg 7.1-27, Eq. 1-33	T_v	522.06	°R					
VP @ daily ave. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VA}	0.0069	psi					
VP @ daily max. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VX}	0.0079	psi					
VP @ daily min. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VN}	0.0059	psi					
Daily vapor pressure range	AP-42, Section 7.1, pg 7.1-18, Eq. 1-9	ΔP_V	0.0020	psia					
Breather vent pressure setting range	AP-42, Section 7.1, pg 7.1-19, Eq. 1-10	ΔP_B	0.06	psig					
Breather vent pressure setting	AP-42, Section 7.1, pg 7.1-19	P_{BP}	0.03	psig					
Breather vent vacuum setting	AP-42, Section 7.1, pg 7.1-19	P_{BV}	(0.03)	psig					
Vent setting correction factor	AP-42, Section 7.1, pg 7.1-28, Eq. 1-37 notes	Kb	1.00	Dimensionless					

INPUT DATA					CALCULATIONS				
	Reference	**Symbol**		**Units**			**Symbol**		**Units**
Calculations for Horizontal Tanks					**Constants**				
Effective Diameter Calculation					Ideal Gas Constant	Input	R	10.731	psia*ft^3/lb-mole**R
Length	Input	L	11.00	ft	ASTM-D86 distillation slope				
Diameter	Input	D	5.63	ft		AP-42, Section 7.1, Table 7.1-2, pg 7.1-92	S		°F/vol %
Effective Diameter	AP-42, Section 7.1, pg 7.1-21, Eq. 1-14	D_e	8.88	ft	Constant in VP Equation	AP-42, Section 7.1, pg 7.1-82, Fig. 7.1-15	A	12.101	Dimensionless
					Constant in VP Equation	AP-42, Section 7.1, pg 7.1-82, Fig. 7.1-15	B	8907	°R
Effective Height Calculation									
Effective Height	AP-42, Section 7.1, pg 7.1-21, Eq. 1-15	H_e	4.422	ft					
Annual Throughput Rate									
Diesel	Air Permit Application	None	24000	gal					

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 5

Flow Diagram Designation
Snag Grinder #1
EU77

Maximum Hourly Capacity
7.50 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Snag Grinder #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
Snag Grinder #1										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)		12.000	0.034	0.034						
Annual (TPY)		**32.000**	**0.090**	**0.090**						
Total Emission Rate:										
Hourly (lb/hr)		12.000	0.034	0.034						
Annual (TPY)		**32.000**	**0.090**	**0.090**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Hourly equipment capacity
Note 5: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Snag Grinder #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 5

Flow Diagram Designation
Snag Grinder #2
EU78

Maximum Hourly Capacity
7.50 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Snag Grinder #2
Control Device: Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Snag Grinder #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	12.000	0.034	0.034						
	Annual (TPY)	**32.000**	**0.090**	**0.090**						
Total Emission Rate:										
	Hourly (lb/hr)	12.000	0.034	0.034						
	Annual (TPY)	**32.000**	**0.090**	**0.090**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Hourly equipment capacity
Note 5: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Snag Grinder #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
135.0 Tons/Year Note 1

Flow Diagram Designation
Core Wash Station #2
EU79

Maximum Hourly Capacity
0.338 Tons/Hour Note 1

Process Description:
Fritz Winter North America, LP
Core Wash Station #2
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Core Wash Station #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						0.10%			
(source)							Note 2			
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)							0.675			
Annual (TPY)							**0.135**			
Total Emission Rate:										
Hourly (lb/hr)							0.675			
Annual (TPY)							**0.135**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Usage from original permit application
Note 2: VOC Content of product per supplier (0.1% VOC), Kerntop WV 031 111

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Wash Station #2

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
10.0 Tons/Year Note 4

Flow Diagram Designation
Rust Prohibitive Application
EU82

Maximum Hourly Capacity
0.013 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Rust Prohibitive Application
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Rust Prohibitive Application									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						10.00%			
(source)							Note 1,2			
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)						2.500			
	Annual (TPY)						**1.000**			
Total Emission Rate:										
	Hourly (lb/hr)						2.500			
	Annual (TPY)						**1.000**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Weight loss study
Note 2: Usage is for virgin product. Virgin product is thinned with water prior to use.
Note 3: Hourly equipment capacity
Note 4: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Rust Prohibitive Application

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
87,600 Tons/Year

Flow Diagram Designation
Rotary Sprue Cleaner and Conveyors
EU83

Maximum Hourly Capacity
10.00 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Rotary Sprue Cleaner and Conveyors
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Rotary Sprue Cleaner and Conveyors										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.65	0.540	0.540						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)		6.500	5.400	5.400						
Annual (TPY)		**28.470**	**23.652**	**23.652**						
Total Emission Rate:										
Hourly (lb/hr)		6.500	5.400	5.400						
Annual (TPY)		**28.470**	**23.652**	**23.652**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AIRS Facilities Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants (EPA Document No. 450/4-90-003, March 1990)
Note 2: WebFire SCC 30400350
Note 3: Assume $PM_{2.5}$ is equal to PM_{10} emission factor
Note 4: Potential throughput rate is 6.6 tph sprue/metallics, 10 tph sand. Emission factor based on sand.

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Rotary Sprue Cleaner and Conveyors

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 5

Flow Diagram Designation
Perforation Line #1
EU84

Maximum Hourly Capacity
7.50 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Perforation Line #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Perforation Line #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)	12.000	0.034	0.034						
	Annual (TPY)	**32.000**	**0.090**	**0.090**						
Total Emission Rate:										
	Hourly (lb/hr)	12.000	0.034	0.034						
	Annual (TPY)	**32.000**	**0.090**	**0.090**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10
Note 4: Hourly equipment capacity
Note 5: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Perforation Line #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Appendix F
Controlled Emission Calculations – Form DEP7007N

Calculated Control Efficiencies

Control Device Description	Control Device ID Number	Stack ID Number	PM	PM10	PM2.5	SOx	NOx	VOC (Note 1)	CO	Lead	CO2e	Control Efficiency Basis
Melt Baghouse (CU01)	CU01	ST02	94.79%	94.55%	94.43%							APCD control efficiency calculated based on inlet using uncontrolled emission factors and outlet based on grain loading and air volume of control device.
Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent Filter (CU02)	CU02	ST03	83.08%	83.08%	83.08%							APCD control efficiency calculated based on inlet using uncontrolled emission factors and outlet based on grain loading and air volume of control device.
Mold Silica Sand Silo Bin Vent Filter (CU03)	CU03	ST04	99.74%	99.74%	99.74%							APCD control efficiency calculated based on inlet using uncontrolled emission factors and outlet based on grain loading and air volume of control device.
Blend Silo Bin Vent Filter (CU04)	CU04	ST05	99.74%	99.74%	99.74%							APCD control efficiency calculated based on inlet using uncontrolled emission factors and outlet based on grain loading and air volume of control device.
Bentonite Silo Bin Vent Filter (CU05)	CU05	ST06	99.74%	99.74%	99.74%							APCD control efficiency calculated based on inlet using uncontrolled emission factors and outlet based on grain loading and air volume of control device.
Sand Plant Baghouse (CU06)	CU06	ST07	99.77%	98.75%	98.62%							APCD control efficiency calculated based on inlet using uncontrolled emission factors and outlet based on grain loading and air volume of control device.
Acid Scrubber (CU07)	CU07	ST08	95.13%	95.13%	95.13%			97.00%				APCD control efficiency calculated based on inlet using uncontrolled emission factors and outlet based on grain loading and air volume of control device.
Core/Mold Baghouse (CU08)	CU08	ST09	84.26%	83.63%	80.91%							APCD control efficiency calculated based on inlet using uncontrolled emission factors and outlet based on grain loading and air volume of control device.
Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)	CU10	ST11	83.08%	83.08%	83.08%							APCD control efficiency calculated based on inlet using uncontrolled emission factors and outlet based on grain loading and air volume of control device.
Fettling Baghouse (CU11)	CU11	ST12	99.79%	98.23%	98.22%							APCD control efficiency calculated based on inlet using uncontrolled emission factors and outlet based on grain loading and air volume of control device.
Fettling Baghouse Waste Dust Silo Bin Vent Filter (CU12)	CU12	ST13	83.08%	83.08%	83.08%							APCD control efficiency calculated based on inlet using uncontrolled emission factors and outlet based on grain loading and air volume of control device.
Machining Cartridge Collectors (CU13a-h)	CU13a-h	FUG	99.00%	99.00%	99.00%							APCD control efficiency assumed 99%. APCD emits indoors with exhuast gases captured and emitted from a secondary APCD. Emissions are included with secondary APCD.
Perforation Line #2 Cartridge Collector (CU13j)	CU13j	FUG	99.00%	99.00%	99.00%							APCD control efficiency assumed 99%. APCD emits indoors with exhuast gases captured and emitted from a secondary APCD. Emissions are included with secondary APCD.
Perforation Line #1 Cartridge Collector (CU13i)	CU13i	FUG	99.00%	99.00%	99.00%							APCD control efficiency assumed 99%. APCD emits indoors with exhuast gases captured and emitted from a secondary APCD. Emissions are included with secondary APCD.
Paint Line #3 Booth Filter (CU14)	CU14	ST15A	99.35%	99.35%	99.35%							APCD control efficiency based on 95th Confidence Interval of 06/2024 stack test and hourly coating capacity.
Paint Line #2 Booth Filter (CU15)	CU15	ST15B	99.00%	99.00%	99.00%							APCD control efficiency based on 95th Confidence Interval of 06/2024 stack test and hourly coating capacity.
Paint Line #1 Booth Filter (CU17)	CU17	ST16	62.85%	62.85%	62.85%							APCD control efficiency based on 95th Confidence Interval of 06/2024 stack test and hourly coating capacity.
Core Silica Sand Silo A Bin Vent Filter (CU19)	CU19	FUG	99.00%	99.00%	99.00%							APCD control efficiency assumed 99%. APCD emits indoors with exhuast gases captured and emitted from a secondary APCD. Emissions are included with secondary APCD.
Core Silica Sand Silo B Bin Vent Filter (CU20)	CU20	FUG	99.00%	99.00%	99.00%							APCD control efficiency assumed 99%. APCD emits indoors with exhuast gases captured and emitted from a secondary APCD. Emissions are included with secondary APCD.
Snag Grinder #1 Fabric Filter (CU21)	CU21	FUG	99.00%	99.00%	99.00%							APCD control efficiency assumed 99%. APCD emits indoors with exhuast gases captured and emitted from a secondary APCD. Emissions are included with secondary APCD.
Snag Grinder #2 Fabric Filter (CU22)	CU22	FUG	99.00%	99.00%	99.00%							APCD control efficiency assumed 99%. APCD emits indoors with exhuast gases captured and emitted from a secondary APCD. Emissions are included with secondary APCD.
Emergency Generator #1	EU72	STG1										
Emergency Generator #2	EU73	STG2										
Emergency Generator #3	EU74	STG3										
Diesel Storage Tank	EU75	STTK1										

Note 1: PM, PM_{10} and $PM_{2.5}$ emissions are included in the emissions from the identified air pollution control device.

Facility Summary (Hourly)

PROCESS	EU ID	Stack ID	Emissions Estimates - PSD Regulated Pollutants lbs/hr									
			PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO2e	
Charge Handling	EU01	ST02	0.055	0.057	0.050							
Refractory Burner #1	EU05	ST02	0.003	0.003	0.004	0.005	0.833	0.046	0.700	0.000	1000.000	
Refractory Burner #2	EU06	ST02	0.003	0.003	0.004	0.005	0.833	0.046	0.700	0.000	1000.000	
Induction Furnace #1	EU07	ST02	0.469	0.469	0.471			2.341	13.944	0.007		
Induction Furnace #2	EU08	ST02	0.469	0.469	0.471			2.341	13.944	0.007		
Induction Furnace #3	EU09	ST02	0.469	0.469	0.471			2.341	13.944	0.007		
Induction Furnace #4	EU10	ST02	0.469	0.469	0.471			2.341	13.944	0.007		
Hot Metal Transfer	EU13	ST02	0.044	0.042	0.038							
Pouring Furnace #1	EU15	ST02	*0.001*	*0.001*	*0.001*	*0.002*	*0.285*	*0.016*	*0.240*	*0.000*	*342.353*	
Melt and Core/Mold Baghouse Dust Silo	EU17	ST03	0.015	0.015	0.015							
Refractory Curing Mobile Burner	EU18	ST02	*0.001*	*0.001*	*0.001*	*0.001*	*0.196*	*0.011*	*0.165*	*0.000*	*235.294*	
Mold Silica Sand Silo	EU19	ST04	*0.016*	*0.016*	*0.016*							
Blend Silo	EU20	ST05	0.016	0.016	0.016							
Bentonite Silo	EU21	ST06	0.016	0.016	0.016							
Mold Sand Handling and Preparation	EU22	ST07	1.639	1.337	1.475							
Mold Making #1	EU33	ST09	0.094	0.098	0.115							
Core Silica Sand Silo A	EU35A	ST09	*0.060*	*0.060*	*0.060*							Note 1
Core Silica Sand Silo B	EU35B	ST09	0.060	0.060	0.060							Note 1
Core Sand Handling and Preparation	EU36	ST09	0.190	0.164	0.192							
PUCB Core Machine #1(Resin)	EU39	ST09	0.044	0.045	0.053			0.104				
PUCB Core Machine #1(Resin+Cat)	EU39	ST08	0.016	0.016	0.016			0.624				
PUCB Core Machine #1 (Core Release)	EU39	ST08						3.570				
PUCB Core Machine #2(Resin)	EU40	ST09	0.044	0.045	0.053			0.104				
PUCB Core Machine #2(Resin+Cat)	EU40	ST08	0.016	0.016	0.016			0.624				
PUCB Core Machine #2 (Core Release)	EU40	ST08						3.570				
Core Wash Station #1	EU43	ST09						*0.675*				
Core Dryer #1	EU44	ST09	*0.005*	*0.005*	*0.006*	*0.002*	*0.392*	*0.022*	*0.329*	*0.000*	*470.588*	
Core Dryer #2	EU45	ST09	*0.005*	*0.005*	*0.006*	*0.002*	*0.392*	*0.022*	*0.329*	*0.000*	*470.588*	
Pouring #1	EU50	ST09	*0.968*	*1.007*	*0.963*	*0.300*	*0.150*	*53.101*	*92.488*	*0.001*		
Mold Cooling	EU52	ST09										
Shakeout Conveyor	EU53	ST07	*0.110*	*0.420*	*0.277*			*9.240*	*7.725*			
Sand Plant Waste Sand Silo	EU57	ST11	*0.015*	*0.015*	*0.015*							
Casting Cooling	EU59	ST09	*0.076*	*0.055*	*0.038*							
Sorting Conveyor	EU60	ST12	*0.001*	*0.003*	*0.002*							
Steel Shot Blasting #1	EU61	ST12	*0.488*	*0.451*	*0.454*							
Fettling Baghouse Waste Dust Silo	EU63	ST13	0.015	0.015	0.015							
Auto Grinding #1	EU64	ST12	0.025	0.001	0.001							
Auto Grinding #2	EU65	ST12	0.025	0.001	0.001							
Machining Lines (9)	EU66	ST16	0.240	0.001	0.001							Note 1
Perforation Line #2	EU67	ST16	0.120	0.000	0.000							Note 1
Paint Line #3 (Coating)	EU68	ST15A	*0.015*	*0.015*	*0.015*			*2.430*				
Paint Line #3 (Thinner)	EU68	ST15A						*1.000*				
Paint Line #2(Coating)	EU69	ST15B	*0.023*	*0.023*	*0.023*			*2.430*				
Paint Line #2(Thinner)	EU69	ST15B						*1.000*				
Paint Line #1	EU71	ST16	*0.251*	*0.251*	*0.251*			*0.992*				
Emergency Generator #1	EU72	STG1	*5.12E-01*	*5.12E-01*	*5.12E-01*	*1.11E+01*	*2.35E+01*	*6.62E-01*	*6.25E+00*		*1.21E+03*	
Emergency Generator #2	EU73	STG2	*5.12E-01*	*5.12E-01*	*5.12E-01*	*1.12E+01*	*2.35E+01*	*6.62E-01*	*6.25E+00*		*1.21E+03*	
Emergency Generator #3	EU74	STG3	*1.22E-01*	*1.22E-01*	*1.22E-01*	*1.14E-01*	*1.73E+00*	*1.37E-01*	*3.72E-01*		*6.43E+01*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Snag Grinder #1	EU77	ST12	0.120	0.000	0.000							Note 1
Snag Grinder #2	EU78	ST12	*0.120*	*0.000*	*0.000*							Note 1
Core Wash Station #2	EU79	ST09						*0.675*				
Rust Prohibitive Application	EU82	ST16						*2.500*				
Rotary Sprue Cleaner and Conveyors	EU83	ST12	*0.014*	*0.096*	*0.096*							
Perforation Line #1	EU84	ST16	*0.320*	*0.001*	*0.001*							Note 1
Total Emissions			**8.31**	**7.40**	**7.40**	**22.74**	**51.85**	**94.54**	**171.32**	**0.03**	**6008.61**	

Note 1: Emissions from this air pollution control device are emitted inside the facility and subsequently captured via a second air pollution control device.

Facility Summary (Annual)

PROCESS	EU ID	Stack ID	Emissions Estimates - PSD Regulated Pollutants (Tons/Year) PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO2e	
Charge Handling	EU01	ST02	0.146	0.153	0.134							
Refractory Burner #1	EU05	ST02	0.014	0.015	0.015	0.022	3.650	0.201	3.066	9.51E-07	4380.000	
Refractory Burner #2	EU06	ST02	0.014	0.015	0.015	0.022	3.650	0.201	3.066	9.51E-07	4380.000	
Induction Furnace #1	EU07	ST02	0.469	0.469	0.471			2.341	13.944	7.29E-03		
Induction Furnace #2	EU08	ST02	0.469	0.469	0.471			2.341	13.944	7.29E-03		
Induction Furnace #3	EU09	ST02	0.469	0.469	0.471			2.341	13.944	7.29E-03		
Induction Furnace #4	EU10	ST02	0.469	0.469	0.471			2.341	13.944	7.29E-03		
Hot Metal Transfer	EU13	ST02	0.117	0.112	0.102							
Pouring Furnace #1	EU15	ST02	*0.005*	*0.005*	*0.005*	*0.007*	*1.250*	*0.069*	*1.050*	*3.26E-07*	*1499.506*	
Melt and Core/Mold Baghouse Dust Silo	EU17	ST03	0.067	0.067	0.067							
Refractory Curing Mobile Burner	EU18	ST02	*0.003*	*0.004*	*0.004*	*0.005*	*0.859*	*0.047*	*0.721*	*2.24E-07*	*1030.588*	
Mold Silica Sand Silo	EU19	ST04	0.007	0.007	0.007							
Blend Silo	EU20	ST05	0.002	0.002	0.002							
Bentonite Silo	EU21	ST06	0.001	0.001	0.001							
Mold Sand Handling and Preparation	EU22	ST07	2.967	2.419	2.671							
Mold Making #1	EU33	ST09	0.252	0.262	0.305							
Core Silica Sand Silo A	EU35A	ST09	*0.004*	*0.004*	*0.004*							Note 1
Core Silica Sand Silo B	EU35B	ST09	0.004	0.004	0.004							Note 1
Core Sand Handling and Preparation	EU36	ST09	0.342	0.296	0.345							
PUCB Core Machine #1(Resin)	EU39	ST09	0.079	0.082	0.096			0.189				
PUCB Core Machine #1(Resin+Cat)	EU39	ST08	0.029	0.029	0.029			1.128				
PUCB Core Machine #1 (Core Release)	EU39	ST08						6.545				
PUCB Core Machine #2(Resin)	EU40	ST09	0.079	0.082	0.096			0.189				
PUCB Core Machine #2(Resin+Cat)	EU40	ST08	*0.029*	*0.029*	*0.029*			*1.128*				
PUCB Core Machine #2 (Core Release)	EU40	ST08						*6.545*				
Core Wash Station #1	EU43	ST09						*0.135*				
Core Dryer #1	EU44	ST09	*0.021*	*0.021*	*0.025*	*0.010*	*1.718*	*0.094*	*1.443*	*1.35E-06*	*2061.176*	
Core Dryer #2	EU45	ST09	*0.021*	*0.021*	*0.025*	*0.010*	*1.718*	*0.094*	*1.443*	*1.35E-06*	*2061.176*	
Pouring #1	EU50	ST09	*2.581*	*2.685*	*2.567*	*0.800*	*0.400*	*141.604*	*246.634*	*3.02E-03*		
Mold Cooling	EU52	ST09										
Shakeout Conveyor	EU53	ST07	*0.294*	*1.120*	*0.740*			*24.640*	*20.600*			
Sand Plant Waste Sand Silo	EU57	ST11	*0.067*	*0.067*	*0.067*							
Casting Cooling	EU59	ST09	*0.201*	*0.147*	*0.102*							
Sorting Conveyor	EU60	ST12	*0.001*	*0.008*	*0.005*							
Steel Shot Blasting #1	EU61	ST12	*1.302*	*1.204*	*1.210*							
Fettling Baghouse Waste Dust Silo	EU63	ST13	0.067	0.067	0.067							
Auto Grinding #1	EU64	ST12	0.067	0.002	0.002							
Auto Grinding #2	EU65	ST12	0.067	0.002	0.002							
Machining Lines (9)	EU66	ST16	0.640	0.002	0.002							Note 1
Perforation Line #2	EU67	ST16	0.320	0.001	0.001							Note 1
Paint Line #3 (Coating)	EU68	ST15A	0.061	0.061	0.061			9.720				
Paint Line #3 (Thinner)	EU68	ST15A						4.000				
Paint Line #2(Coating)	EU69	ST15B	*0.094*	*0.094*	*0.094*			*9.720*				
Paint Line #2(Thinner)	EU69	ST15B						*4.000*				
Paint Line #1	EU71	ST16	*0.457*	*0.457*	*0.457*			*1.804*				
Emergency Generator #1	EU72	STG1	*2.56E-02*	*2.56E-02*	*2.56E-02*	*5.57E-01*	*1.18E+00*	*3.31E-02*	*3.12E-01*		*60.64*	
Emergency Generator #2	EU73	STG2	*2.56E-02*	*2.56E-02*	*2.56E-02*	*5.59E-01*	*1.18E+00*	*3.31E-02*	*3.12E-01*		*60.64*	
Emergency Generator #3	EU74	STG3	*6.08E-03*	*6.08E-03*	*6.08E-03*	*5.68E-03*	*8.64E-02*	*6.86E-03*	*1.86E-02*		*3.21*	
Diesel Storage Tank	EU75	STTK1						*0.918*				
Snag Grinder #1	EU77	ST12	*0.320*	*0.001*	*0.001*							Note 1
Snag Grinder #2	EU78	ST12	*0.320*	*0.001*	*0.001*							Note 1
Core Wash Station #2	EU79	ST09						*0.135*				
Rust Prohibitive Application	EU82	ST16						*1.000*				
Rotary Sprue Cleaner and Conveyors	EU83	ST12	*0.060*	*0.419*	*0.421*							
Perforation Line #1	EU84	ST16	*0.320*	*0.001*	*0.001*							Note 1
Total Emissions			**13.38**	**11.90**	**11.72**	**2.00**	**15.68**	**223.54**	**334.44**	**0.03**	**15536.94**	

Note 1: Emissions from this air pollution control device are emitted inside the facility and subsequently captured via a second air pollution control device.

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 6

Flow Diagram Designation
Charge Handling
EU01

Maximum Hourly Capacity
15.00 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Charge Handling
Control Device: Melt Baghouse (CU01) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Charge Handling										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		0.07	0.07	0.06						
(source)		Note 1	Note 1	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency		94.79	94.55	94.43						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.055	0.057	0.050						
Annual (TPY)		**0.146**	**0.153**	**0.134**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.055	0.057	0.050						
Annual (TPY)		**0.146**	**0.153**	**0.134**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Gutow Article, Modern Casting; January 1972; PM emissions from Raw material handling (0.04 lbs/ton) and charge makeup (0.03 lbs/ton) released to the atmosphere. All PM emission were conservatively assumed to be PM-10 emissions.
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to $PM_{2.5}$ ratio and uncontrolled PM emission factor.
Note 3: The Alloy Storage emission unit (EU02) is included in this emission unit.
Note 4: Secondary capture of fugitive emissions per testing conducted pursuant to permit term EG01,3.I
Note 5: Hourly capacity based on potential Pouring (EU50) throughput rate
Note 6: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Charge Handling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Applicaiton
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
73.00 MMCF/Year Note 3

Flow Diagram Designation
Refractory Burner #1
EU05

Maximum Hourly Capacity
0.008 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Refractory Burner #1
Control Device: Melt Baghouse (CU01) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Refractory Burner #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency	94.79	94.55	94.43					94.79	
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.003	0.003	0.004	0.005	0.833	0.046	0.700	2.17E-07	1000.000
	Annual (TPY)		**0.014**	**0.015**	**0.015**	**0.022**	**3.650**	**0.201**	**3.066**	9.51E-07	**4380.000**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.003	0.003	0.004	0.005	0.833	0.046	0.700	2.17E-07	1000.000
	Annual (TPY)		**0.014**	**0.015**	**0.015**	**0.022**	**3.650**	**0.201**	**3.066**	**9.51E-07**	**4380.000**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 8.5 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Applicaiton
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Refractory Burner #1

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			1.67E-06	7.30E-06	**1.67E-06**	**7.30E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			1.00E-07	4.38E-07	**1.00E-07**	**4.38E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			9.17E-06	4.02E-05	**9.17E-06**	**4.02E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			1.17E-05	5.11E-05	**1.17E-05**	**5.11E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			7.00E-07	3.07E-06	**7.00E-07**	**3.07E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			3.17E-06	1.39E-05	**3.17E-06**	**1.39E-05**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			2.17E-06	9.49E-06	**2.17E-06**	**9.49E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			1.75E-05	7.67E-05	**1.75E-05**	**7.67E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			2.00E-07	8.76E-07	**2.00E-07**	**8.76E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			2.00E-08	8.76E-08	**2.00E-08**	**8.76E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			1.75E-05	7.67E-05	**1.75E-05**	**7.67E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			1.00E-05	4.38E-05	**1.00E-05**	**4.38E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			6.25E-04	2.74E-03	**6.25E-04**	**2.74E-03**	Note 1
Hexane	110-54-3	1.80E+00			1.50E-02	6.57E-02	**1.50E-02**	**6.57E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			5.08E-06	2.23E-05	**5.08E-06**	**2.23E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			2.83E-05	1.24E-04	**2.83E-05**	**1.24E-04**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			2.00E-07	8.76E-07	**2.00E-07**	**8.76E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			1.33E-07	5.84E-07	**1.33E-07**	**5.84E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			2.50E-08	1.10E-07	**2.50E-08**	**1.10E-07**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			2.33E-08	1.02E-07	**2.33E-08**	**1.02E-07**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			1.42E-07	6.21E-07	**1.42E-07**	**6.21E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			4.17E-08	1.83E-07	**4.17E-08**	**1.83E-07**	Note 1,3
	Total HAPs				1.57E-02	6.89E-02	**1.57E-02**	**6.89E-02**	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
73.00 MMCF/Year Note 3

Flow Diagram Designation
Refractory Burner #2
EU06

Maximum Hourly Capacity
0.008 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Refractory Burner #2
Control Device: Melt Baghouse (CU01) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Refractory Burner #2										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency	94.79	94.55	94.43					94.79	
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.003	0.003	0.004	0.005	0.833	0.046	0.700	2.17E-07	1000.000
	Annual (TPY)		**0.014**	**0.015**	**0.015**	**0.022**	**3.650**	**0.201**	**3.066**	9.51E-07	**4380.000**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.003	0.003	0.004	0.005	0.833	0.046	0.700	2.17E-07	1000.000
	Annual (TPY)		**0.014**	**0.015**	**0.015**	**0.022**	**3.650**	**0.201**	**3.066**	**9.51E-07**	**4380.000**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 8.5 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Refractory Burner #2

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			1.67E-06	7.30E-06	**1.67E-06**	**7.30E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			1.00E-07	4.38E-07	**1.00E-07**	**4.38E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			9.17E-06	4.02E-05	**9.17E-06**	**4.02E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			1.17E-05	5.11E-05	**1.17E-05**	**5.11E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			7.00E-07	3.07E-06	**7.00E-07**	**3.07E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			3.17E-06	1.39E-05	**3.17E-06**	**1.39E-05**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			2.17E-06	9.49E-06	**2.17E-06**	**9.49E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			1.75E-05	7.67E-05	**1.75E-05**	**7.67E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			2.00E-07	8.76E-07	**2.00E-07**	**8.76E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			2.00E-08	8.76E-08	**2.00E-08**	**8.76E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			1.75E-05	7.67E-05	**1.75E-05**	**7.67E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			1.00E-05	4.38E-05	**1.00E-05**	**4.38E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			6.25E-04	2.74E-03	**6.25E-04**	**2.74E-03**	Note 1
Hexane	110-54-3	1.80E+00			1.50E-02	6.57E-02	**1.50E-02**	**6.57E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			5.08E-06	2.23E-05	**5.08E-06**	**2.23E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			2.83E-05	1.24E-04	**2.83E-05**	**1.24E-04**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			2.00E-07	8.76E-07	**2.00E-07**	**8.76E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			1.33E-07	5.84E-07	**1.33E-07**	**5.84E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			1.00E-08	4.38E-08	**1.00E-08**	**4.38E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			2.50E-08	1.10E-07	**2.50E-08**	**1.10E-07**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			2.33E-08	1.02E-07	**2.33E-08**	**1.02E-07**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			1.50E-08	6.57E-08	**1.50E-08**	**6.57E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			1.42E-07	6.21E-07	**1.42E-07**	**6.21E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			4.17E-08	1.83E-07	**4.17E-08**	**1.83E-07**	Note 1,3
Total HAPs					1.57E-02	6.89E-02	**1.57E-02**	**6.89E-02**	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
20,000 Tons/Year Note 7

Flow Diagram Designation
Induction Furnace #1
EU07

Maximum Hourly Capacity
10.00 Tons/Hour Note 6

Process Description:
Fritz Winter North America, LP
Induction Furnace #1
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.23	1.39	0.014	
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency	100.00	100.00	100.00			100.00	100.00	100.00	
	Control Efficiency	94.79	94.55	94.43					94.79	
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.469	0.469	0.471			2.341	13.944	0.007	
	Annual (TPY)	**0.469**	**0.469**	**0.471**			**2.341**	**13.944**	**0.007**	
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.469	0.469	0.471			2.341	13.944	0.007	
	Annual (TPY)	**0.469**	**0.469**	**0.471**			**2.341**	**13.944**	**0.007**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: Based on upper 95th% Confidence Interval of 2020 and 2024 CU01_ST02 stack test results; considering other units vented to this stack
Note 4: CERP Test Report #RE2000084 CO (6/15/2003), Table 3
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 6: Equipment hourly capacity
Note 7: 1/4 of the requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
20,000 Tons/Year Note 7

Flow Diagram Designation
Induction Furnace #2
EU08

Maximum Hourly Capacity
10.00 Tons/Hour Note 6

Process Description:
Fritz Winter North America, LP
Induction Furnace #2
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.23	1.39	0.014	
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency	100.00	100.00	100.00			100.00	100.00	100.00	
	Control Efficiency	94.79	94.55	94.43					94.79	
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.469	0.469	0.471			2.341	13.944	0.007	
	Annual (TPY)	**0.469**	**0.469**	**0.471**			**2.341**	**13.944**	**7.29E-03**	
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.469	0.469	0.471			2.341	13.944	0.007	
	Annual (TPY)	**0.469**	**0.469**	**0.471**			**2.341**	**13.944**	**0.007**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: Based on upper 95th% Confidence Interval of 2020 and 2024 CU01_ST02 stack test results; considering other units vented to this stack
Note 4: CERP Test Report #RE2000084 CO (6/15/2003), Table 3
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 6: Equipment hourly capacity
Note 7: 1/4 of the requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
20,000 Tons/Year Note 7

Flow Diagram Designation
Induction Furnace #3
EU09

Maximum Hourly Capacity
10.00 Tons/Hour Note 6

Process Description:
Fritz Winter North America, LP
Induction Furnace #3
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #3									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.23	1.39	0.014	
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency	100.00	100.00	100.00			100.00	100.00	100.00	
	Control Efficiency	94.79	94.55	94.43					94.79	
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.469	0.469	0.471			2.341	13.944	0.007	
	Annual (TPY)	**0.469**	**0.469**	**0.471**			**2.341**	**13.944**	**7.29E-03**	
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.469	0.469	0.471			2.341	13.944	0.007	
	Annual (TPY)	**0.469**	**0.469**	**0.471**			**2.341**	**13.944**	**0.007**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: Based on upper 95th% Confidence Interval of 2020 and 2024 CU01_ST02 stack test results; considering other units vented to this stack
Note 4: CERP Test Report #RE2000084 CO (6/15/2003), Table 3
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 6: Equipment hourly capacity
Note 7: 1/4 of the requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #3

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
20,000 Tons/Year Note 7

Flow Diagram Designation
Induction Furnace #4
EU10

Maximum Hourly Capacity
10.00 Tons/Hour Note 6

Process Description:
Fritz Winter North America, LP
Induction Furnace #4
Control Device: Melt Baghouse (CU01) Note 5
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Induction Furnace #4									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.90	0.86	0.85			0.23	1.39	0.014	
(source)		Note 1	Note 1	Note 2			Note 3	Note 3	Note 4	
	Capture Efficiency	100.00	100.00	100.00			100.00	100.00	100.00	
	Control Efficiency	94.79	94.55	94.43					94.79	
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.469	0.469	0.471			2.341	13.944	0.007	
	Annual (TPY)	**0.469**	**0.469**	**0.471**			**2.341**	**13.944**	**0.007**	
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.469	0.469	0.471			2.341	13.944	0.007	
	Annual (TPY)	**0.469**	**0.469**	**0.471**			**2.341**	**13.944**	**0.007**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-03
Note 2: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 3: Based on upper 95th% Confidence Interval of 2020 and 2024 CU01_ST02 stack test results; considering other units vented to this stack
Note 4: CERP Test Report #RE2000084 CO (6/15/2003), Table 3
Note 5: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 6: Equipment hourly capacity
Note 7: 1/4 of the requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM & PM-10}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead}=(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)*(Lead EF/PM EF)
Maximum Annual (Ton/yr) Stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Induction Furnace #4

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 5

Flow Diagram Designation
Hot Metal Transfer
EU13

Maximum Hourly Capacity
15.00 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Hot Metal Transfer
Control Device: Melt Baghouse (CU01) Note 3
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:	**Criteria Pollutants**								
Hot Metal Transfer									
Emission Factor Basis:	**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	0.056	0.052	0.046						
(source)	Note 1	Note 2	Note 2						
Capture Efficiency	100.00	100.00	100.00						
Control Efficiency	94.79	94.55	94.43						
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.044	0.042	0.038						
Annual (TPY)	**0.117**	**0.112**	**0.102**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.044	0.042	0.038						
Annual (TPY)	**0.117**	**0.112**	**0.102**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Hot metal transfer at building monitor. AP-42, Ch. 12-5, Table 12.5-1
Note 2: Emission factor based on USEPA PM Calculator $PM/PM_{10}/PM_{2.5}$ ratio and uncontrolled PM emission factor for SCC 30400320
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 4: Hourly capacity based on potential Pouring (EU50) throughput rate
Note 5: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Hot Metal Transfer

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
24.99 MMCF/Year Note 3

Flow Diagram Designation
Pouring Furnace #1
EU15

Maximum Hourly Capacity
0.0029 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Pouring Furnace #1
Control Device: Melt Baghouse (CU01) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Pouring Furnace #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency	94.79	94.55	94.43					94.79	
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.001	0.001	0.001	0.002	0.285	0.016	0.240	7.43E-08	342.353
	Annual (TPY)		**0.005**	**0.005**	**0.005**	**0.007**	**1.250**	**0.069**	**1.050**	3.26E-07	**1499.506**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.001	0.001	0.001	0.002	0.285	0.016	0.240	7.43E-08	342.353
	Annual (TPY)		**0.005**	**0.005**	**0.005**	**0.007**	**1.250**	**0.069**	**1.050**	**3.26E-07**	**1499.506**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 2.91 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Pouring Furnace #1

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			5.71E-07	2.50E-06	**5.71E-07**	**2.50E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			3.42E-08	1.50E-07	**3.42E-08**	**1.50E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			3.14E-06	1.37E-05	**3.14E-06**	**1.37E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			3.99E-06	1.75E-05	**3.99E-06**	**1.75E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			2.40E-07	1.05E-06	**2.40E-07**	**1.05E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			1.08E-06	4.75E-06	**1.08E-06**	**4.75E-06**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			7.42E-07	3.25E-06	**7.42E-07**	**3.25E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			5.99E-06	2.62E-05	**5.99E-06**	**2.62E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			6.85E-08	3.00E-07	**6.85E-08**	**3.00E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			6.85E-09	3.00E-08	**6.85E-09**	**3.00E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			5.99E-06	2.62E-05	**5.99E-06**	**2.62E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			3.42E-06	1.50E-05	**3.42E-06**	**1.50E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			2.14E-04	9.37E-04	**2.14E-04**	**9.37E-04**	Note 1
Hexane	110-54-3	1.80E+00			5.14E-03	2.25E-02	**5.14E-03**	**2.25E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			1.74E-06	7.62E-06	**1.74E-06**	**7.62E-06**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			9.70E-06	4.25E-05	**9.70E-06**	**4.25E-05**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			6.85E-08	3.00E-07	**6.85E-08**	**3.00E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			4.56E-08	2.00E-07	**4.56E-08**	**2.00E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			3.42E-09	1.50E-08	**3.42E-09**	**1.50E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			3.42E-09	1.50E-08	**3.42E-09**	**1.50E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			3.42E-09	1.50E-08	**3.42E-09**	**1.50E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			8.56E-09	3.75E-08	**8.56E-09**	**3.75E-08**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			7.99E-09	3.50E-08	**7.99E-09**	**3.50E-08**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			5.14E-09	2.25E-08	**5.14E-09**	**2.25E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			4.85E-08	2.12E-07	**4.85E-08**	**2.12E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			1.43E-08	6.25E-08	**1.43E-08**	**6.25E-08**	Note 1,3
	Total HAPs				5.39E-03	2.36E-02	**5.39E-03**	**2.36E-02**	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,323 Tons/Year Note 4

Flow Diagram Designation
Melt and Core/Mold Baghouse Dust Silo
EU17

Maximum Hourly Capacity
0.38 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Melt and Core/Mold Baghouse Dust Silo
Control Device: Melt and Core/Mold BHs Dust Silo Bin Vent Filter (CU02)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Melt and Core/Mold Baghouse Dust Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency		83.08	83.08	83.08						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.015	0.015	0.015						
Annual (TPY)		**0.067**	**0.067**	**0.067**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.015	0.015	0.015						
Annual (TPY)		**0.067**	**0.067**	**0.067**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on mass balance of dust from serviced fabric filters
Note 4: Annual based on hourly times 8,760 hours per year

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Melt and Core/Mold Baghouse Dust Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
17.18 MMCF/Year Note 3

Flow Diagram Designation
Refractory Curing Mobile Burner
EU18

Maximum Hourly Capacity
0.002 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Refractory Curing Mobile Burner
Control Device: Melt Baghouse (CU01) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Refractory Curing Mobile Burner										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency	94.79	94.55	94.43					94.79	
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.001	0.001	0.001	0.001	0.196	0.011	0.165	5.11E-08	235.294
	Annual (TPY)		**0.003**	**0.004**	**0.004**	**0.005**	**0.859**	**0.047**	**0.721**	2.24E-07	**1030.588**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.001	0.001	0.001	0.001	0.196	0.011	0.165	5.11E-08	235.294
	Annual (TPY)		**0.003**	**0.004**	**0.004**	**0.005**	**0.859**	**0.047**	**0.721**	**2.24E-07**	**1030.588**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 2.0 MMBtu/hr natural-gas fired burner; 1020 But/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Refractory Curing Mobile Burner

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			3.92E-07	1.72E-06	**3.92E-07**	**1.72E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			2.35E-08	1.03E-07	**2.35E-08**	**1.03E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			2.16E-06	9.45E-06	**2.16E-06**	**9.45E-06**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			2.75E-06	1.20E-05	**2.75E-06**	**1.20E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			1.65E-07	7.21E-07	**1.65E-07**	**7.21E-07**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			7.45E-07	3.26E-06	**7.45E-07**	**3.26E-06**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			5.10E-07	2.23E-06	**5.10E-07**	**2.23E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			4.12E-06	1.80E-05	**4.12E-06**	**1.80E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			4.71E-08	2.06E-07	**4.71E-08**	**2.06E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			3.53E-09	1.55E-08	**3.53E-09**	**1.55E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			3.53E-09	1.55E-08	**3.53E-09**	**1.55E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			4.12E-06	1.80E-05	**4.12E-06**	**1.80E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			2.35E-06	1.03E-05	**2.35E-06**	**1.03E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			1.47E-04	6.44E-04	**1.47E-04**	**6.44E-04**	Note 1
Hexane	110-54-3	1.80E+00			3.53E-03	1.55E-02	**3.53E-03**	**1.55E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			1.20E-06	5.24E-06	**1.20E-06**	**5.24E-06**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			6.67E-06	2.92E-05	**6.67E-06**	**2.92E-05**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05							
3-Methylchloranthrene (POM)	56-49-5	1.80E-06							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05							
Benz(a)anthracene (POM)	56-55-3	1.80E-06							
Benzo(a)pyrene (POM)	50-32-8	1.20E-06							
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06							
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06							
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06							
Chrysene (POM)	218-01-9	1.80E-06							
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06							
Fluoranthene (POM)	206-44-0	3.00E-06							
Fluorene (POM)	86-73-7	2.80E-06							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06							
Phenanathrene (POM)	85-01-8	1.70E-05							
Pyrene (POM)	129-00-0	5.00E-06							
	Total HAPs				3.70E-03	1.62E-02	**3.70E-03**	**1.62E-02**	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
21,000 Tons/Year Note 4

Flow Diagram Designation
Mold Silica Sand Silo
EU19

Maximum Hourly Capacity
25.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Mold Silica Sand Silo
Control Device: Mold Silica Sand Silo Bin Vent Filter (CU03)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
Mold Silica Sand Silo										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency		99.74	99.74	99.74						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.016	0.016	0.016						
Annual (TPY)		**0.007**	**0.007**	**0.007**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.016	0.016	0.016						
Annual (TPY)		**0.007**	**0.007**	**0.007**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Silica Sand Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
5,500 Tons/Year Note 4

Flow Diagram Designation
Blend Silo
EU20

Maximum Hourly Capacity
25.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Blend Silo
Control Device: Blend Silo Bin Vent Filter (CU04)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Blend Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency	99.74	99.74	99.74						
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.016	0.016	0.016						
	Annual (TPY)	**0.002**	**0.002**	**0.002**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.016	0.016	0.016						
	Annual (TPY)	**0.002**	**0.002**	**0.002**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Blend Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,500 Tons/Year Note 4

Flow Diagram Designation
Bentonite Silo
EU21

Maximum Hourly Capacity
25.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Bentonite Silo
Control Device: Bentonite Silo Bin Vent Filter (CU05)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Bentonite Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency		99.74	99.74	99.74						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.016	0.016	0.016						
Annual (TPY)		**0.001**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.016	0.016	0.016						
Annual (TPY)		**0.001**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Bentonite Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
716,760 Tons/Year Note 5

Flow Diagram Designation
Mold Sand Handling and Preparation
EU22

Maximum Hourly Capacity
198.00 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Mold Sand Handling and Preparation
Control Device: Sand Plant Baghouse (CU06) Note 3
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Mold Sand Handling and Preparation										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	3.60	0.54	0.54						
(source)			Note 1	Note 1	Note 2						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency	99.77	98.75	98.62						
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		1.639	1.337	1.475						
	Annual (TPY)		**2.967**	**2.419**	**2.671**						
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		1.639	1.337	1.475						
	Annual (TPY)		**2.967**	**2.419**	**2.671**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from FIRE 6.25 SCC 3-04-003-50
Note 2: Assumes PM2.5 is equal to PM10
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 4: Hourly equipment capacity
Note 5: Requested maximum tons of sand processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Sand Handling and Preparation

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Annual Actual Throughput
80,000 Tons/Year Note 6

Flow Diagram Designation
Mold Making #1
EU33

Hourly Actual Throughput
15.00 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Mold Making #1

Control Device: Core/Mold Baghouse (CU08) Note 3
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:	Criteria Pollutants								
Mold Making #1									
Emission Factor Basis:	PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:	0.04	0.04	0.04						
(source)	Note 1	Note 2	Note 2			Note 4			
Capture Efficiency	100.00	100.00	100.00						
Control Efficiency	84.26	83.63	80.91						
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.094	0.098	0.115						
Annual (TPY)	**0.252**	**0.262**	**0.305**						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.094	0.098	0.115						
Annual (TPY)	**0.252**	**0.262**	**0.305**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio RACM, Table 2.7-1
Note 2: PM_{10} and $PM_{2.5}$ assumed equal to PM.
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 4: Emissions from mold release (Zip-Slip LR57HP) quantified with pouring, cooling and shakeout
Note 5: Hourly capacity based on potential Pouring (EU50) throughput rate
Note 6: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Making #1

100.00
84.26

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,345 Tons/Year Note 4

Flow Diagram Designation
Core Silica Sand Silo A
EU35A

Maximum Hourly Capacity
25.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Core Silica Sand Silo A
Control Device: Core Silica Sand Silo A Bin Vent Filter (CU19)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Core Silica Sand Silo A									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency		99.00	99.00	99.00						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.060	0.060	0.060						
Annual (TPY)		**0.004**	**0.004**	**0.004**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.060	0.060	0.060						
Annual (TPY)		**0.004**	**0.004**	**0.004**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Silica Sand Silo A

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,345 Tons/Year Note 4

Flow Diagram Designation
Core Silica Sand Silo B
EU35B

Maximum Hourly Capacity
25.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Core Silica Sand Silo B
Control Device: Core Silica Sand Silo B Bin Vent Filter (CU20)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Core Silica Sand Silo B									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency		99.00	99.00	99.00						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.060	0.060	0.060						
Annual (TPY)		**0.004**	**0.004**	**0.004**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.060	0.060	0.060						
Annual (TPY)		**0.004**	**0.004**	**0.004**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on pnuematic truck load-in
Note 4: Requested maximum tons of material received per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Silica Sand Silo B

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
6,690 Tons/Year Note 5

Flow Diagram Designation
Core Sand Handling and Preparation
EU36

Maximum Hourly Capacity
1.86 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Core Sand Handling and Preparation

Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Core Sand Handling and Preparation										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.65	0.54	0.54						
(source)			Note 1	Note 2	Note 3						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency	84.26	83.63	80.91						
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.190	0.164	0.192						
	Annual (TPY)		**0.342**	**0.296**	**0.345**						
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.190	0.164	0.192						
	Annual (TPY)		**0.342**	**0.296**	**0.345**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AIRS Facility Subsystem SCC and EF Listing (EPA 450/4-90-003, March 1990)
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-50
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Hourly capacity based on potential core machines throughput rate
Note 5: Requested rolling 12-month rolling processing rate

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)) x (8760 hrs/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Sand Handling and Preparation

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

	Maximum Yearly Sand Capacity		Maximum Yearly Resin Capacity
	3,345 Tons/Year Note 7		40.14 Tons/Year Note 3,7
Flow Diagram Designation	Maximum Hourly Sand Capacity		Maximum Hourly Resin Capacity
PUCB Core Machine #1(Resin)	0.93 Tons/Hour Note 6		22.20 Lbs/Hour Note 3
EU39			
Process Description:			
Fritz Winter North America, LP			
PUCB Core Machine #1(Resin)			
Control Device:	Core/Mold Baghouse (CU08) Note 5		
SCC Code:			
Control Device Outlet:	gr/dscf		
Airflow:	acfm		
Stack Gas Temperature:	°F		

Facility Process Name:		Criteria Pollutants								
PUCB Core Machine #1(Resin)										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton sand	0.30	0.30	0.30			0.0047			
(source)		Note 1	Note 8	Note 8			Note 2,3,4			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency		84.26	83.63	80.91						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.044	0.045	0.053			0.104			
Annual (TPY)		**0.079**	**0.082**	**0.096**			**0.189**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.044	0.045	0.053			0.104			
Annual (TPY)		**0.079**	**0.082**	**0.096**			**0.189**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 2: Resin VOC EF at ST09: ASK Chemicals Vendor Test, June 2025, After Mixing (0.17g loss/36g resin total = 0.0047 lb/lb resin)
Note 3: ASK Chemicals Vendor Test based on 1.2% resin (based on sand); identical maximum rate used by FWNA
Note 4: Emission factor based on lb per lb resin
Note 5: VOC emissions are captured and exhausted to Core/Mold Baghouse (CU08)
Note 6: Hourly equipment capacity
Note 7: Requested rolling 12-month rolling processing rate
Note 8: Assumes PM_{10} and $PM_{2.5}$ equivalent to PM

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1(Resin)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	0.0034			3.15E-03	5.69E-03	**3.15E-03**	**5.69E-03**	Note 8
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0221			2.04E-02	3.70E-02	**2.04E-02**	**3.70E-02**	Note 8
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0138			1.28E-02	2.31E-02	**1.28E-02**	**2.31E-02**	Note 8
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
Total HAPs					3.64E-02	6.57E-02	3.64E-02	6.57E-02	

Note 8: CERP Report (Tecknikon #1409-123-EQ) December 2002, Table 3-2

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

	Maximum Yearly Sand Capacity	Maximum Yearly Resin Capacity	Maximum Yearly Catalyst Capacity
	3,345 Tons/Year	40.14 Tons/Year Note 4,8	6.02 Tons/Year Note 5,8
Flow Diagram Designation	Maximum Hourly Sand Capacity	Maximum Hourly Resin Capacity	Maximum Hourly Catalyst Capacity
PUCB Core Machine #1(Resin+Cat)	0.93 Tons/Hour	22.20 Lbs/Hour Note 4	3.33 Lbs/Hour Note 5
EU39			
Process Description:			
Fritz Winter North America, LP			
PUCB Core Machine #1(Resin+Cat)			
Control Device:	Acid Scrubber (CU07)	Note 6	
SCC Code:			
Control Device Outlet:	gr/dscf		
Airflow:	acfm		
Stack Gas Temperature:	°F		

Facility Process Name:		Criteria Pollutants								
PUCB Core Machine #1(Resin+Cat)										
Emission Factor Basis:		PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:	lb/ton sand	0.35	0.35	0.35			0.028			
(source)		Note 9	Note 10	Note 10			Note 1,2,3			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency		95.13	95.13	95.13						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.016	0.016	0.016			0.624			
Annual (TPY)		**0.029**	**0.029**	**0.029**			**1.128**			
d										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.016	0.016	0.016			0.624			
Annual (TPY)		**0.029**	**0.029**	**0.029**			**1.128**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ASK Chemicals Vendor Test, June 2025, 30 Mins and After (1.02g-0.17g)/36g)=0.0236 g/g binder, for 1.2% Resin Focus 109/209 system
Note 2: Catalyst usage based on 15% of resin; Catalyst 100% emitted; Acid Scrubber amine control efficiency is 97%; (3.33*(1-0.03))/22.22=0.0045 lb/lb resin
Note 3: Emission Factor - 0.236 + 0.0045 = 0.028; Emissions are on a lb/lb resin basis
Note 4: ASK Chemicals Vendor Test based on 1.2% resin (based on sand); identical maximum rate used by FWNA
Note 5: Maximimum catalyst usage is 15% of resin
Note 6: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)
Note 7: Hourly sand processing rate based on equipment capacity
Note 8: Requested rolling 12-month rolling processing rate
Note 9: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 10: Assumes PM_{10} and $PM_{2.5}$ equivalent to PM

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1(Resin+Cat)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Core Release Capacity
7.70 Tons/Year Note 3

Flow Diagram Designation
PUCB Core Machine #1 (Core Release)
EU39

Maximum Hourly Core Release Capacity
0.0021 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #1 (Core Release)

Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #1 (Core Release)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton						1700.000			
(source)							Note 1,2			
	Capture Efficiency						100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ACMOS 118-63 Core Release (84% VOC by weight per SDS and 1/3/2022 email)
HA NIxStix CB/NB Fast Dry (85% VOC per J. Krause 1/3/2022 email)
Note 2: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)
Note 3: Requested rolling 12-month rolling processing rate

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1 (Core Release)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

	Maximum Yearly Sand Capacity		Maximum Yearly Resin Capacity
	3,345 Tons/Year Note 7		40.14 Tons/Year Note 3,7
Flow Diagram Designation	Maximum Hourly Sand Capacity		Maximum Hourly Resin Capacity
PUCB Core Machine #1(Resin)	0.93 Tons/Hour Note 6		22.20 Lbs/Hour Note 3
EU39			
Process Description:			
Fritz Winter North America, LP			
PUCB Core Machine #1(Resin)			
Control Device:	Core/Mold Baghouse (CU08) Note 5		
SCC Code:			
Control Device Outlet:	gr/dscf		
Airflow:	acfm		
Stack Gas Temperature:	°F		

Facility Process Name:		Criteria Pollutants								
PUCB Core Machine #1(Resin)										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton sand	0.30	0.30	0.30			0.0047			
(source)		Note 1	Note 8	Note 8			Note 2,3,4			
	Capture Efficiency	100.00	100.00	100.00			100.00			
	Control Efficiency	84.26	83.63	80.91						
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.044	0.045	0.053			0.104			
	Annual (TPY)	**0.079**	**0.082**	**0.096**			**0.189**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.044	0.045	0.053			0.104			
	Annual (TPY)	**0.079**	**0.082**	**0.096**			**0.189**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 2: Resin VOC EF at ST09: ASK Chemicals Vendor Test, June 2025, After Mixing (0.17g loss/36g resin total = 0.0047 lb/lb resin)
Note 3: ASK Chemicals Vendor Test based on 1.2% resin (based on sand); identical maximum rate used by FWNA
Note 4: Emission factor based on lb per lb resin
Note 5: VOC emissions are captured and exhausted to Mold/Core Baghouse (CU08)
Note 6: Hourly equipment capacity
Note 7: Requested rolling 12-month rolling processing rate
Note 8: Assumes PM_{10} and $PM_{2.5}$ equivalent to PM

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1(Resin)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	0.0034			3.15E-03	5.69E-03	**3.15E-03**	**5.69E-03**	Note 8
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0221			2.04E-02	3.70E-02	**2.04E-02**	**3.70E-02**	Note 8
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0138			1.28E-02	2.31E-02	**1.28E-02**	**2.31E-02**	Note 8
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
Total HAPs					3.64E-02	6.57E-02	3.64E-02	6.57E-02	

Note 8: CERP Report (Tecknikon #1409-123-EQ) December 2002, Table 3-2

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

	Maximum Yearly Sand Capacity	Maximum Yearly Resin Capacity	Maximum Yearly Catalyst Capacity
	3,345 Tons/Year	40.14 Tons/Year Note 4,8	6.02 Tons/Year Note 5,8
Flow Diagram Designation	Maximum Hourly Sand Capacity	Maximum Hourly Resin Capacity	Maximum Hourly Catalyst Capacity
PUCB Core Machine #1(Resin+Cat)	0.93 Tons/Hour	22.20 Lbs/Hour Note 4	3.33 Lbs/Hour Note 5
EU39			
Process Description:			
Fritz Winter North America, LP			
PUCB Core Machine #1(Resin+Cat)			
Control Device:	Acid Scrubber (CU07)	Note 6	
SCC Code:			
Control Device Outlet:	gr/dscf		
Airflow:	acfm		
Stack Gas Temperature:	°F		

Facility Process Name:		Criteria Pollutants								
PUCB Core Machine #1(Resin+Cat)										
Emission Factor Basis:		PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:	lb/ton sand	0.35	0.35	0.35			0.028			
(source)		Note 9	Note 10	Note 10			Note 1,2,3			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency		95.13	95.13	95.13						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.016	0.016	0.016			0.624			
Annual (TPY)		**0.029**	**0.029**	**0.029**			**1.128**			
d										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.016	0.016	0.016			0.624			
Annual (TPY)		**0.029**	**0.029**	**0.029**			**1.128**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ASK Chemicals Vendor Test, June 2025, 30 Mins and After (1.02g-0.17g)/36g)=0.0236 g/g binder, for 1.2% Resin Focus 109/209 system
Note 2: Catalyst usage based on 15% of resin; Catalyst 100% emitted; Acid Scrubber amine control efficiency is 97%; (3.33*(1-0.03))/22.22=0.0045 lb/lb resin
Note 3: Emission Factor - 0.236 + 0.0045 = 0.028; Emissions are on a lb/lb resin basis
Note 4: ASK Chemicals Vendor Test based on 1.2% resin (based on sand); identical maximum rate used by FWNA
Note 5: Maximimum catalyst usage is 15% of resin
Note 6: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)
Note 7: Hourly sand processing rate based on equipment capacity
Note 8: Requested rolling 12-month rolling processing rate
Note 9: Ohio RACM Guide, Page 2-219, Table 2.7-1
Note 10: Assumes PM_{10} and $PM_{2.5}$ equivalent to PM

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1(Resin+Cat)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Core Release Capacity
7.7 Tons/Year Note 3

Flow Diagram Designation
PUCB Core Machine #1 (Core Release)
EU39

Maximum Hourly Core Release Capacity
0.0021 Tons/Hour

Process Description:
Fritz Winter North America, LP
PUCB Core Machine #1 (Core Release)

Control Device: Acid Scrubber (CU07)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	PUCB Core Machine #1 (Core Release)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton						1700.000			
(source)							Note 1,2			
	Capture Efficiency						100.00			
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						3.570			
	Annual (TPY)						**6.545**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: ACMOS 118-63 Core Release (84% VOC by weight per SDS and 1/3/2022 email)
HA NIxStix CB/NB Fast Dry (85% VOC per J. Krause 1/3/2022 email)
Note 2: VOC emissions are captured and exhausted to Acid Scrubber (CU07/ST08)
Note 3: Requested rolling 12-month rolling processing rate

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Emission Factor) x (process weight rate (ton/hr)) x (1-(Settling Factor)/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (1/ Maximum Hourly Process Rate (tons/hr)) x (Annual process weight rate (tons/yr))x (ton/2000)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
PUCB Core Machine #1 (Core Release)

HAPs	CAS No.	Emission Factor lb/ton sand	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Sand Capacity
135.0 Tons/Year Note 1

Flow Diagram Designation
Core Wash Station #1
EU43

Maximum Hourly Sand Capacity
0.338 Tons/Hour Note 1

Process Description:
Fritz Winter North America, LP
Core Wash Station #1
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Core Wash Station #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						0.10%			
(source)							Note 2			
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							0.675			
Annual (TPY)							**0.135**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							0.675			
Annual (TPY)							**0.135**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Usage from original permit application
Note 2: VOC Content of product per supplier (0.1% VOC), Kerntop WV 031 111

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Wash Station #1

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
34.35 MMCF/Year Note 3

Flow Diagram Designation
Core Dryer #1
EU44

Maximum Hourly Capacity
0.004 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Core Dryer #1
Control Device: Core/Mold Baghouse (CU08) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Core Dryer #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1,4	Note 1,4	Note 1,4	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency	84.26	83.63	80.91					84.26	
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.005	0.005	0.006	0.002	0.392	0.022	0.329	3.09E-07	470.588
	Annual (TPY)		**0.021**	**0.021**	**0.025**	**0.010**	**1.718**	**0.094**	**1.443**	**1.35E-06**	**2061.176**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.005	0.005	0.006	0.002	0.392	0.022	0.329	3.09E-07	470.588
	Annual (TPY)		**0.021**	**0.021**	**0.025**	**0.010**	**1.718**	**0.094**	**1.443**	**1.35E-06**	**2061.176**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 4.0 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Core Dryer #1

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			7.84E-07	3.44E-06	**7.84E-07**	**3.44E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			4.71E-08	2.06E-07	**4.71E-08**	**2.06E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			4.31E-06	1.89E-05	**4.31E-06**	**1.89E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			5.49E-06	2.40E-05	**5.49E-06**	**2.40E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			3.29E-07	1.44E-06	**3.29E-07**	**1.44E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			1.49E-06	6.53E-06	**1.49E-06**	**6.53E-06**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			1.02E-06	4.47E-06	**1.02E-06**	**4.47E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			8.24E-06	3.61E-05	**8.24E-06**	**3.61E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			9.41E-08	4.12E-07	**9.41E-08**	**4.12E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			9.41E-09	4.12E-08	**9.41E-09**	**4.12E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			8.24E-06	3.61E-05	**8.24E-06**	**3.61E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			4.71E-06	2.06E-05	**4.71E-06**	**2.06E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			2.94E-04	1.29E-03	**2.94E-04**	**1.29E-03**	Note 1
Hexane	110-54-3	1.80E+00			7.06E-03	3.09E-02	**7.06E-03**	**3.09E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			2.39E-06	1.05E-05	**2.39E-06**	**1.05E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			1.33E-05	5.84E-05	**1.33E-05**	**5.84E-05**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			9.41E-08	4.12E-07	**9.41E-08**	**4.12E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			6.27E-08	2.75E-07	**6.27E-08**	**2.75E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			1.18E-08	5.15E-08	**1.18E-08**	**5.15E-08**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			1.10E-08	4.81E-08	**1.10E-08**	**4.81E-08**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			6.67E-08	2.92E-07	**6.67E-08**	**2.92E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			1.96E-08	8.59E-08	**1.96E-08**	**8.59E-08**	Note 1,3
Total HAPs					7.40E-03	3.24E-02	**7.40E-03**	**3.24E-02**	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.l)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
34.35 MMCF/Year Note 3

Flow Diagram Designation
Core Dryer #2
EU45

Maximum Hourly Capacity
0.004 MMCF/Hour Note 2

Process Description:
McWane Plant & Industrial - Calera, AL
Core Dryer #2
Control Device: Core/Mold Baghouse (CU08) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Core Dryer #2										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:			7.60	7.60	7.60	0.60	100.00	5.50	84.00	5.00E-04	120000.00
(source)			Note 1,4	Note 1,4	Note 1,4	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency	84.26	83.63	80.91					84.26	
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.005	0.005	0.006	0.002	0.392	0.022	0.329	3.09E-07	470.588
	Annual (TPY)		**0.021**	**0.021**	**0.025**	**0.010**	**1.718**	**0.094**	**1.443**	**1.35E-06**	**2061.176**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.005	0.005	0.006	0.002	0.392	0.022	0.329	3.09E-07	470.588
	Annual (TPY)		**0.021**	**0.021**	**0.025**	**0.010**	**1.718**	**0.094**	**1.443**	**1.35E-06**	**2061.176**

POTENTIAL OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: 4.0 MMBtu/hr natural-gas fired burner; 1020 Btu/ft^3 fuel heat content
Note 3: Based on potential operating schedule of 8,760 hours per year
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Core Dryer #2

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2	2.00E-04			7.84E-07	3.44E-06	**7.84E-07**	**3.44E-06**	Note 1
Beryllium (Be)	7440-41-7	1.20E-05			4.71E-08	2.06E-07	**4.71E-08**	**2.06E-07**	Note 1,2
Cadmium (Cd)	7440-43-9	1.10E-03			4.31E-06	1.89E-05	**4.31E-06**	**1.89E-05**	Note 1
Chromium (Cr)	7440-47-3	1.40E-03			5.49E-06	2.40E-05	**5.49E-06**	**2.40E-05**	Note 1
Cobalt (Co)	7440-48-4	8.40E-05			3.29E-07	1.44E-06	**3.29E-07**	**1.44E-06**	Note 1
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5	3.80E-04			1.49E-06	6.53E-06	**1.49E-06**	**6.53E-06**	Note 1
Mercury (Hg)	7439-97-6	2.60E-04			1.02E-06	4.47E-06	**1.02E-06**	**4.47E-06**	Note 1
Nickel (Ni)	7440-02-0	2.10E-03			8.24E-06	3.61E-05	**8.24E-06**	**3.61E-05**	Note 1
Selenium (Se)	7782-49-2	2.40E-05			9.41E-08	4.12E-07	**9.41E-08**	**4.12E-07**	Note 1,2
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Acenaphthylene (POM)	208-96-8	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7	2.40E-06			9.41E-09	4.12E-08	**9.41E-09**	**4.12E-08**	Note 1,2,3
Benzene	71-43-2	2.10E-03			8.24E-06	3.61E-05	**8.24E-06**	**3.61E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6	1.20E-03			4.71E-06	2.06E-05	**4.71E-06**	**2.06E-05**	Note 1
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.50E-02			2.94E-04	1.29E-03	**2.94E-04**	**1.29E-03**	Note 1
Hexane	110-54-3	1.80E+00			7.06E-03	3.09E-02	**7.06E-03**	**3.09E-02**	Note 1
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	6.10E-04			2.39E-06	1.05E-05	**2.39E-06**	**1.05E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	3.40E-03			1.33E-05	5.84E-05	**1.33E-05**	**5.84E-05**	Note 1
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6	2.40E-05			9.41E-08	4.12E-07	**9.41E-08**	**4.12E-07**	Note 1,3
3-Methylchloranthrene (POM)	56-49-5	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6	1.60E-05			6.27E-08	2.75E-07	**6.27E-08**	**2.75E-07**	Note 1,2,3
Benz(a)anthracene (POM)	56-55-3	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Benzo(a)pyrene (POM)	50-32-8	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Benzo(g,h,i)perylene (POM)	191-24-2	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Dibenzo(a,h)anthracene (POM)	53-70-3	1.20E-06			4.71E-09	2.06E-08	**4.71E-09**	**2.06E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	3.00E-06			1.18E-08	5.15E-08	**1.18E-08**	**5.15E-08**	Note 1,3
Fluorene (POM)	86-73-7	2.80E-06			1.10E-08	4.81E-08	**1.10E-08**	**4.81E-08**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	1.80E-06			7.06E-09	3.09E-08	**7.06E-09**	**3.09E-08**	Note 1,2,3
Phenanathrene (POM)	85-01-8	1.70E-05			6.67E-08	2.92E-07	**6.67E-08**	**2.92E-07**	Note 1,3
Pyrene (POM)	129-00-0	5.00E-06			1.96E-08	8.59E-08	**1.96E-08**	**8.59E-08**	Note 1,3
Total HAPs					7.40E-03	3.24E-02	**7.40E-03**	**3.24E-02**	

Note 1: AP-42 Fifth Edition, Supplement D, TABLE 1.4-2,-3 and -4.
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 8

Flow Diagram Designation
Pouring #1
EU50

Maximum Hourly Capacity
15.00 Tons/Hour Note 7

Process Description:
Fritz Winter North America, LP
Pouring #1
Control Device: Core/Mold Baghouse (CU08) Note 6
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Pouring #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.410	0.410	0.336	0.020	0.010	3.540	6.166	4.79E-04	
(source)			Note 1	Note 1	Note 5	Note 2	Note 2	Note 4	Note 4	Note 3	
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
		Control Efficiency	84.26	83.63	80.91					84.26	
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.968	1.007	0.963	0.300	0.150	53.101	92.488	1.13E-03	
	Annual (TPY)		**2.581**	**2.685**	**2.567**	**0.800**	**0.400**	**141.604**	**246.634**	**3.02E-03**	
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.968	1.007	0.963	0.300	0.150	53.101	92.488	1.13E-03	
	Annual (TPY)		**2.581**	**2.685**	**2.567**	**0.800**	**0.400**	**141.604**	**246.634**	**3.02E-03**	

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Stack test at Quality Castings, Orrville, OH.
Note 2: WebFIRE (Aug 20, 2021) SCC 30400320
Note 3: Emission factors taken from the document entitled "Foundry Process Emission Factors: Baseline Emissions from Automotive Foundries in Mexico"; (CERP-Mexico); Table 5.12
Note 4: Based on upper 95th% Confidence Interval of 2019 and 2024 CU08/ST09 stack test results; considering other units vented to this stack
Note 5: Emission factor based on USEPA PM Calculator (March 2012) PM to PM2.5 ratio and uncontrolled PM emission factor.
Note 6: Secondary capture of fugitive emissions per testing conducted (EG01,3.l)
Note 7: Hourly equipment capacity
Note 8: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (E
Maximum Stack Emissions Rate (lb/hr) {SOx,NOx, VOC, CO} =(Max. Rated Capa
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of ope
Maximum Annual (ton/yr) SOx NOx, VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 4

Flow Diagram Designation
Mold Cooling
EU52

Maximum Hourly Capacity
15.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Mold Cooling

Control Device: Core/Mold Baghouse (CU08) Note 2
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Mold Cooling										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton									
(source)			Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Control Efficiency	84.26	83.63	80.91						
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emissions are combined with pouring. See Pouring #1 (EU50) worksheet.
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Hourly equipment capacity
Note 4: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (E
Maximum Stack Emissions Rate (lb/hr) {SOx,NOx, VOC, CO} =(Max. Rated Capa
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of ope
Maximum Annual (ton/yr) SOx NOx, VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Mold Cooling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 5

Flow Diagram Designation
Shakeout Conveyor
EU53

Maximum Hourly Capacity
15.00 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Shakeout Conveyor
Control Device: Sand Plant Baghouse (CU06) Note 3
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Shakeout Conveyor										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	3.20	2.24	1.34			0.616	0.515		
(source)			Note 1	Note 1	Note 1			Note 2	Note 2		
		Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
		Control Efficiency	99.77	98.75	98.62						
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.110	0.420	0.277			9.240	7.725		
	Annual (TPY)		**0.294**	**1.120**	**0.740**			**24.640**	**20.600**		
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.110	0.420	0.277			9.240	7.725		
	Annual (TPY)		**0.294**	**1.120**	**0.740**			**24.640**	**20.600**		

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: WebFire SCC 30400318 (4/15/2021)
Note 2: Based on upper 95th% Confidence Interval of 2018, 2020 and 2024 CU06/ST07 stack test results; considering other units vented to this stack
Note 3: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 4: Hourly equipment capacity
Note 5: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Shakeout Conveyor

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year

Flow Diagram Designation
Pouring Cooling Shakeout HAPs (Mold)
HAPs

Maximum Hourly Capacity
15.00 Tons/Hour

Process Description:
Fritz Winter North America, LP
Pouring Cooling Shakeout HAPs (Mold)

Control Device: CU06 and CU08
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Pouring Cooling Shakeout HAPs (Mold)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton									
(source)		Note 1,2								
	Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: See below for organic HAP emissions from pouring, cooling and shakeout
Note 2: Inorganic HAPs are quantified on the air pollution control device worksheet for CU06 and CU08

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring Cooling Shakeout HAPs (Mold)

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0	0.0045			0.0674	0.1797	**0.0674**	**0.1797**	Note 3
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								Note 3
Anthracene (POM)	120-12-7								
Benzene	71-43-2	0.0728			1.0918	2.9114	**1.0918**	**2.9114**	Note 3
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.0050			0.0747	0.1993	**0.0747**	**0.1993**	Note 3
Formaldehyde	50-00-0								Note 3
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								Note 3
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.0411			0.6164	1.6436	**0.6164**	**1.6436**	Note 3
Xylenes	1330-20-7	0.0303			0.4546	1.2123	**0.4546**	**1.2123**	Note 3,4
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs				2.3049	6.1464	2.3049	6.1464	

Note 3: CERP/Technikon Report 1256-1311DQ for organic HAPs associated with green sand mold, Table 3-1
6 mold average adjusted for LOI (4.06 FWNA; 4.97 DQ Test)
Note 4: Xylene CAS number is used for mixture of isomers

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80 Tons/Year

Flow Diagram Designation
Pouring Cooling Shakeout HAPs (Core)
HAPs

Maximum Hourly Capacity
0.02 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Pouring Cooling Shakeout HAPs (Core)
Control Device: CU06 and CU08
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			Criteria Pollutants								
	Pouring Cooling Shakeout HAPs (Core)										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/lb									
(source)			Note 1,2								
		Capture Efficiency	100.00	100.00	100.00			100.00	100.00		
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: See below for organic HAP emissions from pouring, cooling and shakeout attributed to core
Note 2: Inorganic HAPs are quantified on the air pollution control device worksheet for CU06 and CU08
Note 3: Based on maximum % resin of 1.2% based on sand (BOS)

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Pouring Cooling Shakeout HAPs (Core)

HAPs	CAS No.	Emission Factor lb/lb	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2	0.0084			0.3768	0.6776	**0.3768**	**0.6776**	Note 4
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.0001			0.0027	0.0048	**0.0027**	**0.0048**	Note 4
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	0.0022			0.1000	0.1798	**0.1000**	**0.1798**	Note 4
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2	0.0189			0.8428	1.5157	**0.8428**	**1.5157**	Note 4
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.0012			0.0527	0.0947	**0.0527**	**0.0947**	Note 4
Xylenes	1330-20-7	0.0003			0.0152	0.0273	**0.0152**	**0.0273**	Note 4
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs				1.3901	2.4999	1.3901	2.4999	

Note 4: Supplier emissions incormation for PUCB ASK Focus I/II

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,323 Tons/Year Note 4

Flow Diagram Designation
Sand Plant Waste Sand Silo
EU57

Maximum Hourly Capacity
0.38 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Sand Plant Waste Sand Silo
Control Device: Sand Plant Baghouse Waste Sand Silo Bin Vent Filter (CU10)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Sand Plant Waste Sand Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency		83.08	83.08	83.08						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.015	0.015	0.015						
Annual (TPY)		**0.067**	**0.067**	**0.067**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.015	0.015	0.015						
Annual (TPY)		**0.067**	**0.067**	**0.067**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on mass balance of dust from serviced fabric filters
Note 4: Annual based on hourly times 8,760 hours per year

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Sand Plant Waste Sand Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 4

Flow Diagram Designation
Casting Cooling
EU59

Maximum Hourly Capacity
15.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Casting Cooling
Control Device: Core/Mold Baghouse (CU08) Note 2
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Casting Cooling										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.032	0.022	0.013						
(source)			Note 1	Note 1	Note 1						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency	84.26	83.63	80.91						
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.076	0.055	0.038						
	Annual (TPY)		**0.201**	**0.147**	**0.102**						
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.076	0.055	0.038						
	Annual (TPY)		**0.201**	**0.147**	**0.102**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: 1.0% of emission factor from FIRE 6.25 SCC 3-04-003-31
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Hourly equipment capacity
Note 4: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Casting Cooling

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 4

Flow Diagram Designation
Sorting Conveyor
EU60

Maximum Hourly Capacity
15.00 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Sorting Conveyor

Control Device: Fettling Baghouse (CU11) Note 2
SCC Code:
Control Device Outlet: gr/dscf gr/dscf
Airflow: acfm acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Sorting Conveyor										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:		lb/ton	0.016	0.011	0.007						
(source)			Note 1	Note 1	Note 1						
		Capture Efficiency	100.00	100.00	100.00						
		Control Efficiency	99.79	98.23	98.22						
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.001	0.003	0.002						
	Annual (TPY)		**0.001**	**0.008**	**0.005**						
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.001	0.003	0.002						
	Annual (TPY)		**0.001**	**0.008**	**0.005**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: 0.5% of emission factor from FIRE 6.25 SCC 3-04-003-31
Note 2: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 3: Hourly equipment capacity
Note 4: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Stack Emission Rate (lb/hr) {Lead} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr) x (EF for Lead/EF for PM-10)
Maximum Stack Emissions Rate (lb/hr) {VOC, CO} =(Max. Rated Capacity ton/hr) x (EF in lb/ton) x (Capture Eff./100)
Maximum Annual (Ton/yr) PM, PM10 and lead stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Annual (ton/yr) VOC and CO stack emissions= (Hourly stack emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Sorting Conveyor

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 6

Flow Diagram Designation
Steel Shot Blasting #1
EU61

Maximum Hourly Capacity
15.00 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Steel Shot Blasting #1
Control Device: Fettling Baghouse (CU11) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Steel Shot Blasting #1										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	15.50	1.70	1.70						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency		99.79	98.23	98.22						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.488	0.451	0.454						
Annual (TPY)		**1.302**	**1.204**	**1.210**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.488	0.451	0.454						
Annual (TPY)		**1.302**	**1.204**	**1.210**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-40
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Steel Shot Blasting #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
3,323 Tons/Year Note 4

Flow Diagram Designation
Fettling Baghouse Waste Dust Silo
EU63

Maximum Hourly Capacity
0.38 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Fettling Baghouse Waste Dust Silo
Control Device: Fettling BH Waste Dust Silo Bin Vent Filter (CU12)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Fettling Baghouse Waste Dust Silo									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.24	0.24	0.24						
(source)		Note 1	Note 2	Note 2						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency		83.08	83.08	83.08						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.015	0.015	0.015						
Annual (TPY)		**0.067**	**0.067**	**0.067**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.015	0.015	0.015						
Annual (TPY)		**0.067**	**0.067**	**0.067**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Ohio EPA RACM, Table 2.22-1, pg 2-474, Silo Vent
Note 2: Assumes $PM_{2.5}$ and PM_{10} is equal to PM
Note 3: Hourly capacity based on mass balance of dust from serviced fabric filters
Note 4: Annual based on hourly times 8,760 hours per year

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Fettling Baghouse Waste Dust Silo

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 6

Flow Diagram Designation
Auto Grinding #1
EU64

Maximum Hourly Capacity
7.50 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Auto Grinding #1
Control Device: Fettling Baghouse (CU11) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Auto Grinding #1										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency		99.79	98.23	98.22						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.025	0.001	0.001						
Annual (TPY)		**0.067**	**0.002**	**0.002**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.025	0.001	0.001						
Annual (TPY)		**0.067**	**0.002**	**0.002**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Auto Grinding #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 6

Flow Diagram Designation
Auto Grinding #1
EU64

Maximum Hourly Capacity
7.50 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Auto Grinding #1
Control Device: Fettling Baghouse (CU11) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Auto Grinding #1										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency		99.79	98.23	98.22						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.025	0.001	0.001						
Annual (TPY)		**0.067**	**0.002**	**0.002**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.025	0.001	0.001						
Annual (TPY)		**0.067**	**0.002**	**0.002**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Auto Grinding #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
80,000 Tons/Year Note 6

Flow Diagram Designation
Machining Lines (9)
EU66

Maximum Hourly Capacity
15.00 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Machining Lines (9)
Control Device: Machining Cartridge Collectors (CU13a-h) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Machining Lines (9)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency	99.00	99.00	99.00						
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.240	0.001	0.001						
	Annual (TPY)	**0.640**	**0.002**	**0.002**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.240	0.001	0.001						
	Annual (TPY)	**0.640**	**0.002**	**0.002**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: Requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Machining Lines (9)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 6

Flow Diagram Designation
Perforation Line #2
EU67

Maximum Hourly Capacity
7.50 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Perforation Line #2
Control Device: Perforation Line #2 Cartridge Collector (CU13j) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Perforation Line #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency	99.00	99.00	99.00						
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.120	0.000	0.000						
	Annual (TPY)	**0.320**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.120	0.000	0.000						
	Annual (TPY)	**0.320**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Perforation Line #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
36.00 Tons/Year Note 6

Flow Diagram Designation
Paint Line #3 (Coating)
EU68

Maximum Hourly Capacity
9.00 Lbs/Hour Note 5

Process Description:
Fritz Winter North America, LP
Paint Line #3 (Coating)
Control Device: Paint Line #3 Booth Filter (CU14)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Paint Line #3 (Coating)										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.87	0.87	0.87			0.270			
(source)		Note 1,4	Note 2,4	Note 2,4			Note 7			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency		99.35	99.35	99.35						
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.015	0.015	0.015			2.430			
Annual (TPY)		**0.061**	**0.061**	**0.061**			**9.720**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.015	0.015	0.015			2.430			
Annual (TPY)		**0.061**	**0.061**	**0.061**			**9.720**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Zinc Dust Primer EDS (INMOTIQ Primer SB 1K) (density is 25.75 lb/gal)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM
Note 3: See air pollution control device worksheet for particulate TAC emissions
Note 4: Control efficiency based on 06/2024 stack test 95% Upper CI lb/lb at 10 lb/hr coating usage
Note 5: Hourly equipment capacity
Note 6: Requested maximum material processed per year per rolling 12-month basis
Note 7: 95th percentile confidence interval of highest Line 2 and 3 performance test

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #3 (Coating)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2	0.010%			9.00E-04	3.60E-03	**9.00E-04**	**3.60E-03**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8	0.060%			5.40E-03	2.16E-02	**5.40E-03**	**2.16E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.950%			8.55E-02	3.42E-01	**8.55E-02**	**3.42E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.020%			1.80E-03	7.20E-03	**1.80E-03**	**7.20E-03**	Note 1
Xylenes	1330-20-7	3.890%			3.50E-01	1.40E+00	**3.50E-01**	**1.40E+00**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
Total HAPs					4.44E-01	1.77E+00	4.44E-01	1.77E+00	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #3 (Coating)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6	1.81%			1.63E-01	6.52E-01	**1.63E-01**	**6.52E-01**	Note 1
Zinc (TAC)	7440-66-6								Note 3
Zinc Oxide (TAC)	1314-13-2								Note 3
n-Butyl Acetate (TAC)	123-86-4								
Solvent Naphtha (TAC)	64742-95-6								
1-Butanol (TAC)	71-36-3								
Mesitylene (TAC)	108-67-6								
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								
Other Air Toxics									

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
4.00 Tons/Year Note 4

Flow Diagram Designation
Paint Line #3 (Thinner)
EU68

Maximum Hourly Capacity
1.00 Lbs/Hour Note 3

Process Description:
Fritz Winter North America, LP
Paint Line #3 (Thinner)
Control Device: Paint Line #3 Booth Filter (CU14)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #3 (Thinner)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb						1.00			
(source)							Note 1			
Capture Efficiency							100.00			
Control Efficiency										
Transfer Efficiency										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							1.000			
Annual (TPY)							**4.000**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							1.000			
Annual (TPY)							**4.000**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Reducing Solvent Blend for WG102992 TDS (Thinner Density is 7.26 lb/gal)
Note 2: See air pollution control device worksheet for TAC emissions
Note 3: Hourly equipment capacity
Note 4: Requested maximum material processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #3 (Thinner)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8	0.54%			5.37E-03	2.15E-02	**5.37E-03**	**2.15E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	3.30%			3.30E-02	1.32E-01	**3.30E-02**	**1.32E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7	6.19%			6.19E-02	2.48E-01	**6.19E-02**	**2.48E-01**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
Total HAPs					1.00E-01	4.01E-01	1.00E-01	4.01E-01	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #3 (Thinner)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6								
Zinc (TAC)	7440-66-6								
Zinc Oxide (TAC)	1314-13-2								
n-Butyl Acetate (TAC)	123-86-4	51.59%			5.16E-01	2.06E+00	**5.16E-01**	**2.06E+00**	Note 1
Solvent Naphtha (TAC)	64742-95-6	14.44%			1.44E-01	5.78E-01	**1.44E-01**	**5.78E-01**	Note 1
1-Butanol (TAC)	71-36-3	6.19%			6.19E-02	2.48E-01	**6.19E-02**	**2.48E-01**	Note 1
Mesitylene (TAC)	108-67-6	3.30%			3.30E-02	1.32E-01	**3.30E-02**	**1.32E-01**	Note 1
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								
Other Air Toxics									

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
36.00 Tons/Year Note 6

Flow Diagram Designation
Paint Line #2(Coating)
EU69

Maximum Hourly Capacity
9.00 Lbs/Hour Note 5

Process Description:
Fritz Winter North America, LP
Paint Line #2(Coating)
Control Device: Paint Line #2 Booth Filter (CU15)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Paint Line #2(Coating)										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.87	0.87	0.87			0.27			
(source)		Note 1,4	Note 2,4	Note 2,4			Note 7			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency		99.00	99.00	99.00						
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.023	0.023	0.023			2.430			
Annual (TPY)		**0.094**	**0.094**	**0.094**			**9.720**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.023	0.023	0.023			2.430			
Annual (TPY)		**0.094**	**0.094**	**0.094**			**9.720**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Zinc Dust Primer EDS (INMOTIQ Primer SB 1K) (density is 25.75 lb/gal)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM
Note 3: See air pollution control device worksheet for TAC emissions
Note 4: Control efficiency based on 06/2024 stack test 95% Upper CI lb/lb at 10 lb/hr coating usage
Note 5: Hourly equipment capacity
Note 6: Requested maximum material processed per year per rolling 12-month basis
Note 7: 95th percentile confidence interval of highest Line 2 and 3 performance test

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #2(Coating)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2	0.010%			9.00E-04	3.60E-03	**9.00E-04**	**3.60E-03**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8	0.060%			5.40E-03	2.16E-02	**5.40E-03**	**2.16E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	0.950%			8.55E-02	3.42E-01	**8.55E-02**	**3.42E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	0.020%			1.80E-03	7.20E-03	**1.80E-03**	**7.20E-03**	Note 1
Xylenes	1330-20-7	3.890%			3.50E-01	1.40E+00	**3.50E-01**	**1.40E+00**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
Total HAPs					4.44E-01	1.77E+00	4.44E-01	1.77E+00	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #2(Coating)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6	1.81%			1.63E-01	6.52E-01	**1.63E-01**	**6.52E-01**	Note 1
Zinc (TAC)	7440-66-6								Note 3
Zinc Oxide (TAC)	1314-13-2								Note 3
n-Butyl Acetate (TAC)	123-86-4								
Solvent Naphtha (TAC)	64742-95-6								
1-Butanol (TAC)	71-36-3								
Mesitylene (TAC)	108-67-6								
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								
Other Air Toxics									

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
4.00 Tons/Year Note 4

Flow Diagram Designation
Paint Line #2(Thinner)
EU69

Maximum Hourly Capacity
1.00 Lbs/Hour Note 3

Process Description:
Fritz Winter North America, LP
Paint Line #2(Thinner)
Control Device: Paint Line #2 Booth Filter (CU15)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Paint Line #2(Thinner)									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb						1.00			
(source)							Note 1			
Capture Efficiency							100.00			
Control Efficiency										
Transfer Efficiency										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							1.000			
Annual (TPY)							**4.000**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							1.000			
Annual (TPY)							**4.000**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Worwag Coatings LLC Reducing Solvent Blend for WG102992 TDS (Thinner Density is 7.26 lb/gal)
Note 2: See air pollution control device worksheet for TAC emissions
Note 3: Hourly equipment capacity
Note 4: Requested maximum material processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #2(Thinner)

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8	0.537%			5.37E-03	2.15E-02	**5.37E-03**	**2.15E-02**	Note 1
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4	3.302%			3.30E-02	1.32E-01	**3.30E-02**	**1.32E-01**	Note 1
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7	6.191%			6.19E-02	2.48E-01	**6.19E-02**	**2.48E-01**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
Total HAPs					1.00E-01	4.01E-01	1.00E-01	4.01E-01	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #2(Thinner)

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6								
Zinc (TAC)	7440-66-6								
Zinc Oxide (TAC)	1314-13-2								
n-Butyl Acetate (TAC)	123-86-4	51.59%			5.16E-01	2.06E+00	**5.16E-01**	**2.06E+00**	Note 1
Solvent Naphtha (TAC)	64742-95-6	14.44%			1.44E-01	5.78E-01	**1.44E-01**	**5.78E-01**	Note 1
1-Butanol (TAC)	71-36-3	6.19%			6.19E-02	2.48E-01	**6.19E-02**	**2.48E-01**	Note 1
Mesitylene (TAC)	108-67-6	3.30%			3.30E-02	1.32E-01	**3.30E-02**	**1.32E-01**	Note 1
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8								
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
10.00 Tons/Year Note 8

Flow Diagram Designation
Paint Line #1
EU71

Maximum Hourly Capacity
5.50 Lbs/Hour Note 7

Process Description:
Fritz Winter North America, LP
Paint Line #1
Control Device: Paint Line #1 Booth Filter (CU17)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Paint Line #1										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/lb	0.41	0.41	0.41			0.180			
(source)		Note 1,6	Note 2,6	Note 2,6			Note 3			
Capture Efficiency		100.00	100.00	100.00			100.00			
Control Efficiency		62.85	62.85	62.85						
Transfer Efficiency		70.00	70.00	70.00						
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.251	0.251	0.251			0.992			
Annual (TPY)		**0.457**	**0.457**	**0.457**			**1.804**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.251	0.251	0.251			0.992			
Annual (TPY)		**0.457**	**0.457**	**0.457**			**1.804**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Geomet 360 SDS (upper end of % solids range)
Note 2: Assumes PM_{10} and $PM_{2.5}$ is equal to PM
Note 3: Geomet 360 Air Quality Data Sheet (1.6 lb/gal VOC at coating density of 11.05 lbs/gal
Note 4: Above quantities and emission factors disregard DI water that is used as a thinner
Note 5: See air pollution control device worksheet for TAC emissions
Note 6: Control efficiency based on 06/2024 stack test 95% Upper CI lb/lb at 3.54 lb/hr coating usage
Note 7: Hourly equipment capacity
Note 8: Requested maximum material processed per year per rolling 12-month basis

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EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Paint Line #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9								
Acenaphthylene (POM)	208-96-8								
Acetaldehyde	75-07-0								
Acetophenone	98-86-2								
Acrolein	107-02-8								
Aniline	62-53-3								
Anthracene (POM)	120-12-7								
Benzene	71-43-2								
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0								
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1	3.400%			1.87E-01	3.40E-01	**1.87E-01**	**3.40E-01**	Note 3
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3								
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3								
Xylenes	1330-20-7								
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3								
Benzo(a)pyrene (POM)	50-32-8								
Benzo(b)fluoranthene (POM)	205-99-2								
Benzo(g,h,i)perylene (POM)	191-24-2								
Benzo(k)fluoranthene (POM)	207-08-9								
Chrysene (POM)	218-01-9								
Dibenzo(a,h)anthracene (POM)	53-70-3								
Fluoranthene (POM)	206-44-0								
Fluorene (POM)	86-73-7								
Indeno(1,2,3-cd)pyrene (POM)	193-39-5								
Phenanathrene (POM)	85-01-8								
Pyrene (POM)	129-00-0								
	Total HAPs				1.87E-01	3.40E-01	1.87E-01	3.40E-01	

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
Other Air Toxics
Paint Line #1

Other Air Toxics	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
1,2,4-Trimethylbenzene (TAC)	95-63-6								
Zinc (TAC)	7440-66-6								
Zinc Oxide (TAC)	1314-13-2								
n-Butyl Acetate (TAC)	123-86-4								
Solvent Naphtha (TAC)	64742-95-6								
1-Butanol (TAC)	71-36-3								
Mesitylene (TAC)	108-67-6								
Aluminum Powder (TAC)	7429-90-5								
Distillates, hydrotreated light (TAC)	64742-47-8	1.00%			5.50E-02	1.00E-01	**5.50E-02**	**1.00E-01**	Note 5
Naphtha, Hydrotreated Heavy (TAC)	64742-48-9	1.00%			5.50E-02	1.00E-01	**5.50E-02**	**1.00E-01**	Note 5

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
735.00 MMBtu/Year Note 4

Flow Diagram Designation
Emergency Generator #1
EU72

Maximum Hourly Capacity
7.350 MMBtu/Hour Note 3

Process Description:
McWane Plant & Industrial - Calera, AL
Emergency Generator #1
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Emergency Generator #1										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/MMBtu		0.07	0.07	0.07	1.52	3.20	0.09	0.85		165.00
(source)			Note 1,4	Note 1,4	Note 1,4	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00			100.00			
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.512	0.512	0.512	11.135	23.520	0.662	6.248		1212.750
	Annual (TPY)		0.026	0.026	0.026	**0.557**	**1.176**	**0.033**	**0.312**		**60.638**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.512	0.512	0.512	11.135	23.520	0.662	6.248		1.21E+03
	Annual (TPY)		**0.026**	**0.026**	**0.026**	**0.557**	**1.176**	**0.033**	**0.312**		**6.06E+01**

POTENTIAL OPERATING SCHEDULE
2 HRS/DAY
100 HRS/YEAR

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: Maximum hourly 1050 HP; 7,000 Btu/hp-hr (AP-42 Table 3.3-1, footnote e)
Note 4: Maximum Hourly times potential operating hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Emergency Generator #1

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	4.68E-06			3.44E-05	1.72E-06	**3.44E-05**	**1.72E-06**	Note 1,3
Acenaphthylene (POM)	208-96-8	9.23E-06			6.78E-05	3.39E-06	**6.78E-05**	**3.39E-06**	Note 1,3
Acetaldehyde	75-07-0	2.52E-05			1.85E-04	9.26E-06	**1.85E-04**	**9.26E-06**	Note 1
Acetophenone	98-86-2								
Acrolein	107-02-8	7.88E-06			5.79E-05	2.90E-06	**5.79E-05**	**2.90E-06**	Note 1,2
Aniline	62-53-3								
Anthracene (POM)	120-12-7	1.23E-06			9.04E-06	4.52E-07	**9.04E-06**	**4.52E-07**	Note 1,3
Benzene	71-43-2	7.76E-04			5.70E-03	2.85E-04	**5.70E-03**	**2.85E-04**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.89E-05			5.80E-04	2.90E-05	**5.80E-04**	**2.90E-05**	Note 1
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	1.30E-04			9.56E-04	4.78E-05	**9.56E-04**	**4.78E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	2.81E-04			2.07E-03	1.03E-04	**2.07E-03**	**1.03E-04**	Note 1
Xylenes	1330-20-7	1.93E-04			1.42E-03	7.09E-05	**1.42E-03**	**7.09E-05**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3	6.22E-07			4.57E-06	2.29E-07	**4.57E-06**	**2.29E-07**	Note 1,3
Benzo(a)pyrene (POM)	50-32-8	2.57E-07			1.89E-06	9.44E-08	**1.89E-06**	**9.44E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.11E-06			8.16E-06	4.08E-07	**8.16E-06**	**4.08E-07**	Note 1,3
Benzo(g,h,i)perylene (POM)	191-24-2	5.56E-07			4.09E-06	2.04E-07	**4.09E-06**	**2.04E-07**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	2.18E-07			1.60E-06	8.01E-08	**1.60E-06**	**8.01E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.53E-06			1.12E-05	5.62E-07	**1.12E-05**	**5.62E-07**	Note 1,3
Dibenzo(a,h)anthracene (POM)	53-70-3	3.46E-07			2.54E-06	1.27E-07	**2.54E-06**	**1.27E-07**	Note 1,2,3
Fluoranthene (POM)	206-44-0	4.03E-06			2.96E-05	1.48E-06	**2.96E-05**	**1.48E-06**	Note 1,3
Fluorene (POM)	86-73-7	1.28E-05			9.41E-05	4.70E-06	**9.41E-05**	**4.70E-06**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	4.14E-07			3.04E-06	1.52E-07	**3.04E-06**	**1.52E-07**	Note 1,2,3
Phenanathrene (POM)	85-01-8	4.08E-05			3.00E-04	1.50E-05	**3.00E-04**	**1.50E-05**	Note 1,3
Pyrene (POM)	129-00-0	3.71E-06			2.73E-05	1.36E-06	**2.73E-05**	**1.36E-06**	Note 1,3
Total HAPs					1.16E-02	5.78E-04	**1.16E-02**	**5.78E-04**	

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
735.00 MMBtu/Year Note 4

Flow Diagram Designation
Emergency Generator #2
EU73

Maximum Hourly Capacity
7.350 MMBtu/Hour Note 3

Process Description:
McWane Plant & Industrial - Calera, AL
Emergency Generator #2
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Emergency Generator #2										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/MMBtu		0.07	0.07	0.07	1.52	3.20	0.09	0.85		165.00
(source)			Note 1,4	Note 1,4	Note 1,4	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00			100.00			
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.512	0.512	0.512	11.172	23.520	0.662	6.248		1212.750
	Annual (TPY)		0.026	0.026	0.026	**0.559**	**1.176**	**0.033**	**0.312**		**60.638**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.512	0.512	0.512	11.172	23.520	0.662	6.248		1.21E+03
	Annual (TPY)		**0.026**	**0.026**	**0.026**	**0.559**	**1.176**	**0.033**	**0.312**		**6.06E+01**

POTENTIAL OPERATING SCHEDULE
2 HRS/DAY
100 HRS/YEAR

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: Maximum hourly 1050 HP; 7,000 Btu/hp-hr (AP-42 Table 3.3-1, footnote e)
Note 4: Maximum Hourly times potential operating hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Emergency Generator #2

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0								
Acenaphthene (POM)	83-32-9	4.68E-06			3.44E-05	1.72E-06	**3.44E-05**	**1.72E-06**	Note 1,3
Acenaphthylene (POM)	208-96-8	9.23E-06			6.78E-05	3.39E-06	**6.78E-05**	**3.39E-06**	Note 1,3
Acetaldehyde	75-07-0	2.52E-05			1.85E-04	9.26E-06	**1.85E-04**	**9.26E-06**	Note 1
Acetophenone	98-86-2								
Acrolein	107-02-8	7.88E-06			5.79E-05	2.90E-06	**5.79E-05**	**2.90E-06**	Note 1,2
Aniline	62-53-3								
Anthracene (POM)	120-12-7	1.23E-06			9.04E-06	4.52E-07	**9.04E-06**	**4.52E-07**	Note 1,3
Benzene	71-43-2	7.76E-04			5.70E-03	2.85E-04	**5.70E-03**	**2.85E-04**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	7.89E-05			5.80E-04	2.90E-05	**5.80E-04**	**2.90E-05**	Note 1
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	1.30E-04			9.56E-04	4.78E-05	**9.56E-04**	**4.78E-05**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	2.81E-04			2.07E-03	1.03E-04	**2.07E-03**	**1.03E-04**	Note 1
Xylenes	1330-20-7	1.93E-04			1.42E-03	7.09E-05	**1.42E-03**	**7.09E-05**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3	6.22E-07			4.57E-06	2.29E-07	**4.57E-06**	**2.29E-07**	Note 1,3
Benzo(a)pyrene (POM)	50-32-8	2.57E-07			1.89E-06	9.44E-08	**1.89E-06**	**9.44E-08**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	1.11E-06			8.16E-06	4.08E-07	**8.16E-06**	**4.08E-07**	Note 1,3
Benzo(g,h,i)perylene (POM)	191-24-2	5.56E-07			4.09E-06	2.04E-07	**4.09E-06**	**2.04E-07**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	2.18E-07			1.60E-06	8.01E-08	**1.60E-06**	**8.01E-08**	Note 1,2,3
Chrysene (POM)	218-01-9	1.53E-06			1.12E-05	5.62E-07	**1.12E-05**	**5.62E-07**	Note 1,3
Dibenzo(a,h)anthracene (POM)	53-70-3	3.46E-07			2.54E-06	1.27E-07	**2.54E-06**	**1.27E-07**	Note 1,2,3
Fluoranthene (POM)	206-44-0	4.03E-06			2.96E-05	1.48E-06	**2.96E-05**	**1.48E-06**	Note 1,3
Fluorene (POM)	86-73-7	1.28E-05			9.41E-05	4.70E-06	**9.41E-05**	**4.70E-06**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	4.14E-07			3.04E-06	1.52E-07	**3.04E-06**	**1.52E-07**	Note 1,2,3
Phenanathrene (POM)	85-01-8	4.08E-05			3.00E-04	1.50E-05	**3.00E-04**	**1.50E-05**	Note 1,3
Pyrene (POM)	129-00-0	3.71E-06			2.73E-05	1.36E-06	**2.73E-05**	**1.36E-06**	Note 1,3
	Total HAPs				1.16E-02	5.78E-04	**1.16E-02**	**5.78E-04**	

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
39.20 MMBtu/Year Note 4

Flow Diagram Designation
Emergency Generator #3
EU74

Maximum Hourly Capacity
0.392 MMBtu/Hour Note 3

Process Description:
McWane Plant & Industrial - Calera, AL
Emergency Generator #3
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:			**Criteria Pollutants**								
	Emergency Generator #3										
Emission Factor Basis:			**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/MMBtu		0.31	0.31	0.31	0.29	4.41	0.35	0.95		164.00
(source)			Note 1,4	Note 1,4	Note 1,4	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
		Capture Efficiency	100.00	100.00	100.00			100.00			
		Control Efficiency									
		Building Capt. Eff									
Maximum Stack Emission Rate:											
	Hourly (lb/hr)		0.122	0.122	0.122	0.114	1.729	0.137	0.372		64.288
	Annual (TPY)		0.006	0.006	0.006	**0.006**	**0.086**	**0.007**	**0.019**		**3.214**
Maximum Fugitive Emission Rate:											
	Hourly (lb/hr)										
	Annual (TPY)										
Total Emission Rate:											
	Hourly (lb/hr)		0.122	0.122	0.122	0.114	1.729	0.137	0.372		6.43E+01
	Annual (TPY)		**0.006**	**0.006**	**0.006**	**0.006**	**0.086**	**0.007**	**0.019**		**3.21E+00**

POTENTIAL OPERATING SCHEDULE
2 HRS/DAY
100 HRS/YEAR

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: Maximum hourly 56 HP; 7000.0 Btu/hp-hr (AP-42 Table 3.3-1, footnote e)
Note 4: Maximum Hourly times potential operating hours per year

EXAMPLE CALCULATIONS:
Maximum Emission Rate (lb/hr) {building exhausts} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (% returns/100 for PM10 only) x (1- %fugitive rate/100)
Maximum Emission Rate (lb/hr) {fugitive} = (Emission Factor lb/ton) x (Maximum Hourly Rate tph) x (%returns for PM10 only) x (% fugitive emissions rate/100)
Annual (TPY) Emission Rates = (lb/hr emission rate) x (Maximum Annual Melt Rate) / (Maximum Hourly Melt Rate) / (2000 lbs/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

McWane Plant & Industrial - Calera, AL
HAP Emission Calculations
Emergency Generator #3

HAP/TRI	CAS No.	Emission Factor ($lb/10^6$ scf)	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr	
Antimony (Sb)	7440-36-0								
Arsenic (As)	7440-38-2								
Beryllium (Be)	7440-41-7								
Cadmium (Cd)	7440-43-9								
Chromium (Cr)	7440-47-3								
Cobalt (Co)	7440-48-4								
Lead (Pb)	7439-92-1								
Manganese (Mn)	7439-96-5								
Mercury (Hg)	7439-97-6								
Nickel (Ni)	7440-02-0								
Selenium (Se)	7782-49-2								
1,2,4 Trimethylbenzene	95-63-6								
1,3-Butadiene	106-99-0	3.91E-05			1.53E-05	7.66E-07	**1.53E-05**	**7.66E-07**	
Acenaphthene (POM)	83-32-9	1.42E-06			5.57E-07	2.78E-08	**5.57E-07**	**2.78E-08**	Note 1,3
Acenaphthylene (POM)	208-96-8	5.06E-06			1.98E-06	9.92E-08	**1.98E-06**	**9.92E-08**	Note 1,3
Acetaldehyde	75-07-0	7.67E-04			3.01E-04	1.50E-05	**3.01E-04**	**1.50E-05**	Note 1
Acetophenone	98-86-2								
Acrolein	107-02-8	9.25E-05			3.63E-05	1.81E-06	**3.63E-05**	**1.81E-06**	Note 1,2
Aniline	62-53-3								
Anthracene (POM)	120-12-7	1.87E-06			7.33E-07	3.67E-08	**7.33E-07**	**3.67E-08**	Note 1,3
Benzene	71-43-2	9.33E-04			3.66E-04	1.83E-05	**3.66E-04**	**1.83E-05**	Note 1
Cresol	1319-77-3								
Cumene	98-82-8								
Dibenzofurans	132-64-9								
Dichlorobenzene	25321-22-6								
Ethyl Benzene	100-41-4								
Formaldehyde	50-00-0	1.18E-03			4.63E-04	2.31E-05	**4.63E-04**	**2.31E-05**	Note 1
Hexane	110-54-3								
Hydrogen Flouride	7664-39-3								
Methanol	67-56-1								
Methyl Chloride	74-87-3								
Methylene diphenyl diisocyanate (MDI)	101-68-8								
m-Xylene	108-38-3								
Naphthalene	91-20-3	8.48E-05			3.32E-05	1.66E-06	**3.32E-05**	**1.66E-06**	Note 1
Nitrobenzene	98-95-3								
o-Cresol	95-48-7								
o-Xylene	95-47-6								
Phenol	108-95-2								
Propionaldehyde	123-38-6								
P-Xylene	106-42-3								
Styrene	100-42-5								
Toluene	108-88-3	4.09E-04			1.60E-04	8.02E-06	**1.60E-04**	**8.02E-06**	Note 1
Xylenes	1330-20-7	2.85E-04			1.12E-04	5.59E-06	**1.12E-04**	**5.59E-06**	Note 1
2-Methylnaphthalene (POM)	91-57-6								
3-Methylchloranthrene (POM)	56-49-5								
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6								
Benz(a)anthracene (POM)	56-55-3	1.68E-06			6.59E-07	3.29E-08	**6.59E-07**	**3.29E-08**	Note 1,3
Benzo(a)pyrene (POM)	50-32-8	1.88E-07			7.37E-08	3.68E-09	**7.37E-08**	**3.68E-09**	Note 1,2,3
Benzo(b)fluoranthene (POM)	205-99-2	9.91E-08			3.88E-08	1.94E-09	**3.88E-08**	**1.94E-09**	Note 1,3
Benzo(g,h,i)perylene (POM)	191-24-2	4.89E-07			1.92E-07	9.58E-09	**1.92E-07**	**9.58E-09**	Note 1,2,3
Benzo(k)fluoranthene (POM)	207-08-9	1.55E-07			6.08E-08	3.04E-09	**6.08E-08**	**3.04E-09**	Note 1,2,3
Chrysene (POM)	218-01-9	3.53E-07			1.38E-07	6.92E-09	**1.38E-07**	**6.92E-09**	Note 1,3
Dibenzo(a,h)anthracene (POM)	53-70-3	5.83E-07			2.29E-07	1.14E-08	**2.29E-07**	**1.14E-08**	Note 1,2,3
Fluoranthene (POM)	206-44-0	7.61E-06			2.98E-06	1.49E-07	**2.98E-06**	**1.49E-07**	Note 1,3
Fluorene (POM)	86-73-7	2.92E-05			1.14E-05	5.72E-07	**1.14E-05**	**5.72E-07**	Note 1,3
Indeno(1,2,3-cd)pyrene (POM)	193-39-5	3.75E-07			1.47E-07	7.35E-09	**1.47E-07**	**7.35E-09**	Note 1,2,3
Phenanathrene (POM)	85-01-8	2.94E-05			1.15E-05	5.76E-07	**1.15E-05**	**5.76E-07**	Note 1,3
Pyrene (POM)	129-00-0	4.78E-06			1.87E-06	9.37E-08	**1.87E-06**	**9.37E-08**	Note 1,3
	Total HAPs				1.52E-03	7.59E-05	**1.52E-03**	**7.59E-05**	

Note 1: AP-42, 10/1996, Section 3.4, Tables 3.4-1, 3.4-2, 3.4-3 and 3.4-4 [Large Diesel]
Note 2: Emission rate assumed at upper bound.
Note 3: HAP because it is Polycyclic Organic Matter (POM)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Tank No.	Diesel Storage Tank (1000 gallon)	**Tank type**	Horizontal	**Date**		08/21/25	
Material stored	Fuel Oil No. 2 (Diesel)	**Company**	Fritz Winter North America	**Performed by**		Craig Schmeisser	
City	Franklin	**State**	KY			Mad River Strategies, LLC	
Description	Diesel Storage Tank (1000 gallon)						

INPUT DATA					CALCULATIONS				
	Reference	**Symbol**	**Values**	**Units**		**Reference**	**Symbol**		**Units**
					Breathing losses				
Molecular Weight					Tank vapor space volume	AP-42, Section 7.1, pg 7.1-16, Eq. 1-3	V_V	136.92	ft^3
Molecular weight	AP-42, Section 7.1, Table 7.1-2, pg 7.1-92	M_V	130	Lb/lb-mole	Vapor density	AP-42, Section 7.1, pg 7.1-23, Eq. 1-22	W_V	1.591E-04	lb/ft^3
Tank design data					Vapor space expansion factor	AP-42, Section 7.1, pg 7.1-20, Eq. 1-12	K_E	0.03212	Dimensionless
Shell height	See Horizontal Tank Calcs Below - Calculated	H or H_E	4.42	ft	Vented vapor saturation factor	AP-42, Section 7.1, pg 7.1-22, Eq. 1-21	K_S	0.9992	Dimensionless
Diameter	See Horizontal Tank Calcs Below - Calculated	D or D_E	8.88	ft					
Maximum liquid height	AP-42, Section 7.1, pg 7.1-28	H_{LX}	4.42	ft	**Standing Storage Loss (Breathing Loss)**	AP-42, Section 7.1, pg 7.1-16, Eq. 1-2	L_S	0.2551	lb/yr
Minimum liquid height	AP-42, Section 7.1, pg 7.1-28	H_{LN}	0.00	ft					
Vapor Space Outage	AP-42, Section 7.1, pg 7.1-21	H_{VO}	2.21	ft	**Working losses**	AP-42, Section 7.1, pg 7.1-28, Eq. 1-35	L_W	137.3876	lb/yr
Annual Sum of the increases in liquid level	AP-42, Section 7.1, pg 7.1-28, Eq. 1-37	$\sum H_{OI}$	69.07	ft/yr					
Tank Maximum Liquid Volume	AP-42, Section 7.1, pg 7.1-201, Eq. 60-4	V_{LX}	274	ft^3					
Turnovers	AP-42, Section 7.1, pg 7.1-28	N	16	Dimensionless	**TOTAL LOSSES**	Calculated	L_T	**137.6427**	lb/yr
Net throughput	Calculated @ 31.5 gals/bbl	Q	762	bbl/yr					
Turnover factor	AP-42, Section 7.1, pg 7.1-28	K_N	1.00	Dimensionless					
Working loss product factor	AP-42, Section 7.1, pg 7.1-28	K_P	1.00	Dimensionless					
Net working loss throughput	AP-42, Section 7.1, pg 7.1-29, Eq. 1-38	V_Q	4277.33	bb/yr					
Meteorological data									
Daily ave. ambient temp.	AP-42, Section 7.1, pg 7.1-26, Eq. 1-30	T_{AA}	519.85	°R					
Daily max. ambient temp.	AP-42, Section 7.1, Table 7.1-7, pg 7.1-132 Nashville, TN as location	T_{AX}	529.40	°R					
Daily min. ambient temp.	AP-42, Section 7.1, Table 7.1-7, pg 7.1-63 Nashville, TN as location	T_{AN}	510.30	°R					
Daily ambient temp. range	AP-42, Section 7.1, pg 7.1-19, Eq. 1-11	ΔT_A	19.10	°R					
Tank paint solar absorptance	AP-42, Section 7.1, Table 7.1-6, pg 7.1-102 White Tank	a	0.17	Dimensionless					
Daily total insolation factor	AP-42, Section 7.1, Table 7.1-7, pg 7.1-63 Nashville, TN as location	I	1,316	Btu/ft^2-day					
Liquid bulk temperature	AP-42, Section 7.1, pg 7.1-27, Eq. 1-31	T_B	520.52	°R					
Daily vapor temp. range	AP-42, Section 7.1, pg 7.1-18, Eq. 1-7	ΔT_V	17.84	°R					
Daily ave. liquid surface temp.	AP-42, Section 7.1, pg 7.1-26, Eq. 1-28	T_{LA}	521.37	°R					
Daily max. liquid surface temp.	AP-42, Section 7.1, pg 7.1-83, Fig. 7.1-17	T_{LX}	525.83	°R					
Daily min. liquid surface temp.	AP-42, Section 7.1, pg 7.1-83, Fig. 7.1-17	T_{LN}	516.91	°R					
Average vapor temperature	AP-42, Section 7.1, pg 7.1-27, Eq. 1-33	T_v	522.06	°R					
VP @ daily ave. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VA}	0.0069	psi					
VP @ daily max. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VX}	0.0079	psi					
VP @ daily min. liquid surf. temp.	AP-42, Section 7.1, pg 7.1-24, Eq. 1-25	P_{VN}	0.0059	psi					
Daily vapor pressure range	AP-42, Section 7.1, pg 7.1-18, Eq. 1-9	ΔP_V	0.0020	psia					
Breather vent pressure setting range	AP-42, Section 7.1, pg 7.1-19, Eq. 1-10	ΔP_B	0.06	psig					
Breather vent pressure setting	AP-42, Section 7.1, pg 7.1-19	P_{BP}	0.03	psig					
Breather vent vacuum setting	AP-42, Section 7.1, pg 7.1-19	P_{BV}	(0.03)	psig					
Vent setting correction factor	AP-42, Section 7.1, pg 7.1-28, Eq. 1-37 notes	Kb	1.00	Dimensionless					

INPUT DATA					CALCULATIONS				
	Reference	**Symbol**		**Units**			**Symbol**		**Units**
Calculations for Horizontal Tanks					**Constants**				
Effective Diameter Calculation					Ideal Gas Constant	Input	R	10.731	psia*ft^3/lb-mole**R
Length	Input	L	11.00	ft	ASTM-D86 distillation slope				
Diameter	Input	D	5.63	ft		AP-42, Section 7.1, Table 7.1-2, pg 7.1-92	S		°F/vol %
Effective Diameter	AP-42, Section 7.1, pg 7.1-21, Eq. 1-14	D_e	8.88	ft	Constant in VP Equation	AP-42, Section 7.1, pg 7.1-82, Fig. 7.1-15	A	12.101	Dimensionless
					Constant in VP Equation	AP-42, Section 7.1, pg 7.1-82, Fig. 7.1-15	B	8907	°R
Effective Height Calculation									
Effective Height	AP-42, Section 7.1, pg 7.1-21, Eq. 1-15	H_e	4.422	ft					
Annual Throughput Rate									
Diesel	Air Permit Application	None	24000	gal					

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 6

Flow Diagram Designation
Snag Grinder #1
EU77

Maximum Hourly Capacity
7.50 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Snag Grinder #1
Control Device: Snag Grinder #1 Fabric Filter Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Snag Grinder #1									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency	99.00	99.00	99.00						
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.120	3.38E-04	3.38E-04						
	Annual (TPY)	**0.320**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.120	3.38E-04	3.38E-04						
	Annual (TPY)	**0.320**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Snag Grinder #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 6

Flow Diagram Designation
Snag Grinder #2
EU78

Maximum Hourly Capacity
7.50 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Snag Grinder #2
Control Device: Snag Grinder #2 Fabric Filter Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: 70 °F

Facility Process Name:		**Criteria Pollutants**								
	Snag Grinder #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency		99.00	99.00	99.00						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.120	3.38E-04	3.38E-04						
Annual (TPY)		**0.320**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.120	3.38E-04	3.38E-04						
Annual (TPY)		**0.320**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Snag Grinder #2

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
135.0 Tons/Year Note 1

Flow Diagram Designation
Core Wash Station #2
EU79

Maximum Hourly Capacity
0.338 Tons/Hour Note 1

Process Description:
Fritz Winter North America, LP
Core Wash Station #2
Control Device: Core/Mold Baghouse (CU08)
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Core Wash Station #2									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						0.10%			
(source)							Note 2			
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)							0.675			
Annual (TPY)							**0.135**			
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)							0.675			
Annual (TPY)							**0.135**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Usage from original permit application
Note 2: VOC Content of product per supplier (0.1% VOC), Kerntop WV 031 111

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Core Wash Station #2

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
10.0 Tons/Year Note 4

Flow Diagram Designation
Rust Prohibitive Application
EU82

Maximum Hourly Capacity
0.013 Tons/Hour Note 3

Process Description:
Fritz Winter North America, LP
Rust Prohibitive Application
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
	Rust Prohibitive Application									
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	% by wt.						10.00%			
(source)							Note 1,2			
	Capture Efficiency									
	Control Efficiency									
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)						2.500			
	Annual (TPY)						**1.000**			
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)						2.500			
	Annual (TPY)						**1.000**			

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Weight loss study
Note 2: Usage is for virgin product. Virgin product is thinned with water prior to use.
Note 3: Hourly equipment capacity
Note 4: Requested maximum material processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Fugitive Emission Rate (lb/hr) = (Maximum Hourly Production gal/hr) x (VOC content lb/gal)
Maximum Annual Fugitive Emissions (ton/yr)= (Maximum Annual Production gal/yr) x (VOC content lb/gal) / (2000 lb/ton)

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Rust Prohibitive Application

HAPs	CAS No.	Emission Factor lb/ton	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
Total HAPs								

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
87,600 Tons/Year

Flow Diagram Designation
Rotary Sprue Cleaner and Conveyors
EU83

Maximum Hourly Capacity
10.00 Tons/Hour Note 4

Process Description:
Fritz Winter North America, LP
Rotary Sprue Cleaner and Conveyors

Control Device:	Sand Plant Baghouse (CU06) and Felttling Baghouse (CU11)
SCC Code:	
Control Device Outlet:	gr/dscf
Airflow:	acfm
Stack Gas Temperature:	°F

Facility Process Name:		**Criteria Pollutants**								
Rotary Sprue Cleaner and Conveyors										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	0.65	0.540	0.540						
(source)		Note 1,5	Note 2,5	Note 3,5						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency		99.79	98.23	98.22						
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.014	0.096	0.096						
Annual (TPY)		**0.060**	**0.419**	**0.421**						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.014	0.096	0.096						
Annual (TPY)		**0.060**	**0.419**	**0.421**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AIRS Facilities Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants (EPA Document No. 450/4-90-003, March 1990)
Note 2: WebFire SCC 30400350
Note 3: Assume $PM_{2.5}$ is equal to PM_{10} emission factor
Note 4: Potential throughput rate is 6.6 tph sprue/metallics, 10 tph sand. Emission factor based on sand.
Note 5: Control efficiency associated with Fettling Baghouse is used

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Rotary Sprue Cleaner and Conveyors

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
40,000 Tons/Year Note 6

Flow Diagram Designation
Perforation Line #1
EU84

Maximum Hourly Capacity
7.50 Tons/Hour Note 5

Process Description:
Fritz Winter North America, LP
Perforation Line #1
Control Device: Perforation Line #1 Cartridge Collector (CU13i) Note 4
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		**Criteria Pollutants**								
Perforation Line #1										
Emission Factor Basis:		**PM**	**PM10**	**PM2.5**	**SOx**	**NOx**	**VOC**	**CO**	**Lead**	**CO_2e**
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3						
	Capture Efficiency	100.00	100.00	100.00						
	Control Efficiency	99.00	99.00	99.00						
	Building Capt. Eff									
Maximum Stack Emission Rate:										
	Hourly (lb/hr)	0.120	3.38E-04	3.38E-04						
	Annual (TPY)	**0.320**	**0.001**	**0.001**						
Maximum Fugitive Emission Rate:										
	Hourly (lb/hr)									
	Annual (TPY)									
Total Emission Rate:										
	Hourly (lb/hr)	0.120	3.38E-04	3.38E-04						
	Annual (TPY)	**0.320**	**0.001**	**0.001**						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes $PM_{2.5}$ is equal to PM_{10}
Note 4: Secondary capture of fugitive emissions per testing conducted (EG01,3.I)
Note 5: Hourly equipment capacity
Note 6: 1/2 of requested maximum tons of gray iron processed per year per rolling 12-month basis

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Unit-Level Emission Calculations
PSD Construction/Title V Operating Permit Application
Fritz Winter North America, LP
Franklin, Kentucky

Fritz Winter North America, LP
HAP Emission Calculations
Perforation Line #1

HAPs	CAS No.	Emission Factor % by wt.	Fugitive Emissions lbs/hr	Fugitive Emissions tons/yr	Stack Emissions lbs/hr	Stack Emissions tons/yr	Total Emissions lbs/hr	Total Emissions tons/yr
Antimony (Sb)	7440-36-0							
Arsenic (As)	7440-38-2							
Beryllium (Be)	7440-41-7							
Cadmium (Cd)	7440-43-9							
Chromium (Cr)	7440-47-3							
Cobalt (Co)	7440-48-4							
Lead (Pb)	7439-92-1							
Manganese (Mn)	7439-96-5							
Mercury (Hg)	7439-97-6							
Nickel (Ni)	7440-02-0							
Selenium (Se)	7782-49-2							
1,2,4 Trimethylbenzene	95-63-6							
1,3-Butadiene	106-99-0							
Acenaphthene (POM)	83-32-9							
Acenaphthylene (POM)	208-96-8							
Acetaldehyde	75-07-0							
Acetophenone	98-86-2							
Acrolein	107-02-8							
Aniline	62-53-3							
Anthracene (POM)	120-12-7							
Benzene	71-43-2							
Cresol	1319-77-3							
Cumene	98-82-8							
Dibenzofurans	132-64-9							
Dichlorobenzene	25321-22-6							
Ethyl Benzene	100-41-4							
Formaldehyde	50-00-0							
Hexane	110-54-3							
Hydrogen Flouride	7664-39-3							
Methanol	67-56-1							
Methyl Chloride	74-87-3							
Methylene diphenyl diisocyanate (MDI)	101-68-8							
m-Xylene	108-38-3							
Naphthalene	91-20-3							
Nitrobenzene	98-95-3							
o-Cresol	95-48-7							
o-Xylene	95-47-6							
Phenol	108-95-2							
Propionaldehyde	123-38-6							
P-Xylene	106-42-3							
Styrene	100-42-5							
Toluene	108-88-3							
Xylenes	1330-20-7							
2-Methylnaphthalene (POM)	91-57-6							
3-Methylchloranthrene (POM)	56-49-5							
7,12-Dimethylbenz(a)anthracene (POM)	57-97-6							
Benz(a)anthracene (POM)	56-55-3							
Benzo(a)pyrene (POM)	50-32-8							
Benzo(b)fluoranthene (POM)	205-99-2							
Benzo(g,h,i)perylene (POM)	191-24-2							
Benzo(k)fluoranthene (POM)	207-08-9							
Chrysene (POM)	218-01-9							
Dibenzo(a,h)anthracene (POM)	53-70-3							
Fluoranthene (POM)	206-44-0							
Fluorene (POM)	86-73-7							
Indeno(1,2,3-cd)pyrene (POM)	193-39-5							
Phenanathrene (POM)	85-01-8							
Pyrene (POM)	129-00-0							
	Total HAPs							

Appendix G
Safety Data Sheets

1. Silica Sand
2. Bentonite
3. Premix
4. Zip-Slip LR57HP (Mold Release)
5. Isocure Focus I 109
6. Isocure Focus II 209
7. Isocure Catalyst 706
8. ACMOS 118-63 (Core Release)
9. HA NixStix CB/NB Fast Dry (Core Release)
10. ASK Kerntop WV 031 111 Coating IBC716 FW (Core Release)
11. Castrol Rustilo 4175 (Rust Preventative)
12. Worwag Zinc Dust (SDS)
13. Worwag Zinc Dust (EDS)
14. Worwag Reducer (SDS)
15. Worwag Reducer (TDS)
16. Geomet 360 (SDS)
17. Geomet 360 (AQS)
18. Deionized Water
19. Diesel Fuel

A.F. Gelhar Co., Inc.
Sand for Industry Since 1919

Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: **Silica Sand**
Formula: SiO_2
CAS No.: 14808-60-7
Recommended Use: Foundry and proppant sand

Company Identification: **A.F. Gelhar Co., Inc.**
N2402 County Road A
Fairwater, Wisconsin 53931
920-398-3566 (7:30 am - 5 pm central time)

2. HAZARDS IDENTIFICATION

GHS Classification
Carc. 1A H350
STOT SE 3 H335
STOT RE 1 H372

GHS Labeling
Symbol:

GHS07

GHS08

Signal Word: **DANGER**

Hazard Statements:
H320 Causes eye irritation.
H335 May cause respiratory irritation
H350 May cause cancer by inhalation.
H372 Causes damage to organs (lungs/respiratory system) through prolonged or repeated exposure by inhalation.

Precautionary Statements:
P202 Do not handle until the safety information presented in this SDS has been read and understood.
P260 DO NOT BREATHE DUST.
P270 Do not eat, drink or smoke while handling this product.
P280 Wear eye protection, protective clothing, protective gloves
P264 Wash skin thoroughly after handling.
P304/P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P308/P313 IF exposed or concerned: Get medical advice/attention
P312 Call POISIN CENTER/doctor if you feel unwell
P403/P233 Store in a well ventilated place. Keep container tightly closed
P501 Dispose of contents/containers according to local, regional, national, and international regulations

Avoid creating dust when handling, using or storing. Use with adequate ventilation to keep exposure below recommended exposure limits. Wear eye protection and respiratory protection following this SDS, NIOSH guidelines and other applicable regulations.

Hazards Not Otherwise Classified:
No additional information available

OSHA Hazards
No additional information available

Target Organs
Lungs

Potential Immediate Health Effects
No additional information available

3. COMPOSITION

Substances:

Names	Product Identifier	Composition %	GHS-US classification
Silica Quartz	CAS# 14808-60-7	96 - 99.6	Carc. 1A, H350 STOT SE 3, H335 STOT RE 1, H372

Mixtures:
Not applicable

4. FIRST AID MEASURES

Description of first aid measures:

First-aid measures general:	If medical advice is needed, have product container or label at hand.
First-aid measures after inhalation:	If inhaled, remove to fresh air and keep at rest in a position comfortable for breathing. Obtain medical attention if breathing difficulty persists
First-aid measures after skin contact:	Rinse immediately with plenty of water. Gently wash with plenty of soap and water. Obtain medical attention if irritation persists.
First-aid measures after eye contact:	Immediately rinse with water for a prolonged period while holding the eyelids wide open. Seek medical attention if material is embedded in eye. If eye irritation persists: Get medical advice and
First-aid measures after ingestion:	If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

Symptoms & side effects:

Symptoms/injuries:	Repeated or prolonged inhalation may damage lungs.
Symptoms/injuries after inhalation:	May cause irritation to the respiratory tract, sneezing, coughing, burning sensation of throat with constricting sensation of the larynx and difficulty in breathing.
Symptoms/injuries after skin contact:	Prolonged contact with large amounts of dust may cause mechanical irritation. Dust may cause irritation in skin folds or by contact in combination with tight clothing.
Symptoms/injuries after eye contact:	Redness, pain.
Symptoms/injuries after ingestion:	Abdominal pain.
Chronic symptoms:	Respiratory difficulties. May cause cancer.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media:
Material is not flammable

Unsuitable Extinguishing Media:
Material is not flammable

Special Protective Equipment for Fire-Fighters:
Material is not flammable

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:

General measures:	Do not breathe dust. Avoid generation of dust during clean-up of spills. Recover the product by vacuuming, shoveling or sweeping. Vacuum must be fitted with HEPA filter to prevent release of particulates during clean-up.
Protective equipment:	Wear suitable protective clothing, gloves and eye/face protection. Use recommended respiratory protection.
Emergency procedures:	Collect as solid.

Environmental Precautions:
No additional information is available.

Methods and Materials for Containment and Clean-up

Methods for cleaning up:	Avoid generation of dust during clean-up of spills. Recover the product by vacuuming, shoveling or sweeping. Vacuum must be fitted with HEPA filter to prevent release of particulates during clean-up.

7. HANDLING AND STORAGE

Precautions for Safe Handling:

Additional hazards when processed:	Do not breathe dust.
Precautions for safe handling:	Avoid creating or spreading dust
Hygiene measures:	Handle in accordance with good industrial hygiene and safety procedures. Always wash your hands immediately after handling this product, and once again before leaving the workplace. Do not eat, drink or smoke in areas where product is used.

Recommended Conditions for Storage

Storage conditions:	Store in a dry, cool place. Keep container tightly closed.
Incompatible materials:	In finely divided state: reacts with (strong) oxidizers such as: hydrofluoric acid, chlorine trifluoride, oxygen difluoride, fluorine.
Special rules on packaging:	Keep container closed when no in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure limits:

Chemical	CAS No.	ACGIH TWA (mg/m^3)	US IDHL (mg/m^3)	USA NIOSH REL TWA (mg/m^3)	USA OSHA PEL TWA (mg/m^3)
Quartz	14808-60-7	0.025	50	0.05	(30)/(%SiO2 + 2) = mg/m^3 total dust (10)/(%SiO2 + 2) = mg/m^3 respirable

Engineering controls:
Ensure adequate ventilation, especially in confined areas. Avoid dust production.

Personal protective equipment:
In case of dust production: dustproof clothing. In case of dust production: protective goggles. Insufficient ventilation: wear respiratory protection. High dust production: self-contained breathing apparatus.

Hand Protection:
Impermeable protective gloves.

Skin and Body Protection:
Handle in accordance with good industrial hygiene and safety practice. Always wash your hands immediately after handling this product, and once again before leaving the workplace. Wear suitable protective clothing. Wash contaminated clothing before reuse.

Eye protection:
Protective goggles.

Respiratory protection:
Use NIOSH-approved air-purifying or supplied-air respirator where airborne concentrations of dust are expected to exceed exposure limits.

Consumer exposure controls:
Do not breathe dust. Wear recommended personal protective equipment.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Solid
Odor:	Odorless
Odor threshold:	No data available
pH:	No data available
Melting Point:	No data available
Freezing Point:	No data available
Evaporation Rate:	No data available
Flammability:	No data available
Explosion Limits:	No data available
Vapor Pressure:	No data available
Vapor Density:	No data available
Specific Gravity:	No data available
Solubility in Water:	No data available
Partition coefficient:	No data available
Auto-ignition temp.:	No data available
Decomposition temp.:	No data available
Viscosity:	No data available
Other:	No data available

10. STABILITY AND REACTIVITY

Chemical stability:
Stable under normal temperature and pressure:

Conditions to Avoid:
None known.

Hazardous Decomposition Products:
Quartz (silica) will dissolve in hydrofluoric acid producing corrosive gas, silicon tetrafluoride.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity:
Not classified.

Skin corrosion/irritation:
Not classified.

Serious eye damage/irritation:
Not classified.

Respiratory of skin sensitization:
Not classified.

Germ cell mutagenicity:
Not classified.

Carcinogenicity:
May cause cancer (inhalation).

Quartz Cas 14808-60-7

IRAC group:	Group 1
National Toxicity Program (NTP) Status:	Known Human Carcinogen

Reproductive toxicity:
Not classified.

Specific target organ toxicity (single exposure):
May cause respiratory irritation.

Specific target organ toxicity (repeated exposure):
Causes damage to organs (lung/respiratory) through prolonged or repeated exposure (inhalation).

Additional information:
Repeated or prolonged exposure to respirable crystalline silica dust will cause lung damage in the form of silicosis. Symptoms will include progressively more difficult breathing, cough, fever, and weight loss. Acute silicosis can be fatal.

Aspiration Hazard:
Not classified

12. ECOLOGICAL INFORMATION

Toxicity:
No additional information available.

Persistence and Degradability:
Not readily biodegradable.

Bioaccumulative Potential:
Not expected to bioaccumulate.

Mobility:
No additional information available.

PBT and vPvB assessment:
No additional information available.

Other Adverse Effects
No additional information available.

13. DISPOSAL CONSIDERATIONS

Regional legislation (waste):
Disposal must nbe done in accordance to local, state, and federal regulations

Waste Disposal recommendations:
Not a hazardous waste, per RCRA.

14. TRANSPORT INFORMATION

DOT (US):
Not applicable

IMDG:
Not applicable

IATA:
Not applicable

15. REGULATORY INFORMATION

SARA 302 Compounds
No SARA 302 chemicals present

SARA 313 Compounds
No SARA 313 chemicals present

SARA 311/312 Hazards
Immediate (acute) health hazard.
Delayed (chronic) health hazard.

TSCA listed substances:
Quartz CAS #14808-60-7

National regulations:
Quartz CAS #14808-60-7
Listed on IARC (International Agency for Research on Cancer)
Listed as carcinogen on NTP (National Toxicology Program)

US State Regulations
U.S. - California - Proposition 65 – Carcinogen
WARNING! This product contains Quartz, a substance known to the State of California to cause cancer.

U.S. - Hawaii - Occupational Exposure Limits - TWAs
U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Acceptable Ambient Concentrations
U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Emission Levels (ELs)
U.S. - Idaho - Occupational Exposure Limits - Mineral Dusts
U.S. - Illinois - Toxic Air Contaminant Carcinogens Permissible Exposure Limits - TWAs
U.S. - Maine - Chemicals of High Concern U.S. - Massachusetts - Right To Know List
U.S. - Michigan - Occupational Exposure Limits - TWAs
U.S. - Minnesota - Chemicals of High Concern
U.S. - Minnesota - Hazardous Substance List
U.S. - Minnesota - Permissible Exposure Limits - TWAs
U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - 24-Hour
U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - Annual
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New Jersey - Special Health Hazards Substances List
U.S. - Oregon - Permissible Exposure Limits - Mineral Dusts
U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Tennessee - Occupational Exposure Limits - TWAs
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term Washington -
U.S. - Vermont - Permissible Exposure Limits - TWAs
U.S. - Washington - Permissible Exposure Limits - STELs U.S. - STELS
U.S. - Washington - Permissible Exposure Limits - STELs U.S. - TWAs

16. OTHER INFORMATION

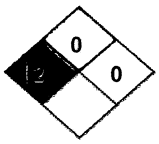
HMIS Classification:

Health Hazard:	2
Chronic Health Hazard:	-
Flammability:	0
Physical Hazards:	0
Personal Protection:	E

(Safety glasses, gloves, and dust respirator)

NFPA Rating:

Health Hazard:	2
Fire:	0
Reactivity Hazard:	0
Special Hazard:	None



Full text of H- phrases:

Carc. 1A	Carcinogenicity Category 1A
STOT RE 1	Specific target organ toxicity (repeated exposure) Category 1
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H335	May cause respiratory irritation
H350	May cause cancer
H372	Causes damage to organs through prolonged or repeated exposure

No data is available, per 29 CFR 1910.1200(d)(b); health hazards are based upon all of the components which make up the mixture.

The above information is believed to be correct, but is not purported to be all-inclusive and should only be used as a guide. Because data, safety standards, and regulatory inputs are subject to change, no warranty, guarantee, or representation with respect to the completeness or continuing accuracy of the information contained in this document is made. The user of this product must decide what safety measures are necessary to safely use this product; the conditions of handling and use, or misuse, are beyond the control of A.F. Gelhar Co., Inc.. The user is also responsible to determine its environmental regulatory compliance obligations under any applicable federal or state laws.

IMERYS
Metalcasting Solutions

SAFETY DATA SHEET

Product Trade Name: **IKOQUICK® Grade Bentonite**

Revision Date: 30-Aug-2016

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name:	IKOQUICK® Grade Bentonite
Synonyms:	None
Chemical Family:	Mineral
Application:	Additive
Manufacturer/Supplier	**S&B Industrial Minerals NA, Inc.** 100 Mansell Ct., Suite 300, Roswell, GA30076 Telephone: (319) 235-1900 Fax: (319) 232-7966 Emergency Telephone: (800) 424-9300 Call Chemtrec
Prepared By	EHS&Q Coordinator Telephone: 1-319-235-1900

2. HAZARD(S) IDENTIFICATION

Classification:	STOT RE1
Signal Word:	**DANGER**
Hazard Statement:	Causes damage to lungs through prolonged or repeated exposure via inhalation.
Precautionary statements:	Do not breathe dust In case of inadequate ventilation wear respiratory protection Dispose of contents/containers in accordance with local regulation
Other:	Long term exposure can cause lung injury (silicosis). IARC and NTP have determined that crystalline silica inhaled from occupational sources can cause cancer in humans. Risk of injury is dependent on the duration and level of exposure.

3. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Bentonite	1302-78-9	> 75%		5 mg/m^3 Respirable Dust 15 mg/m^3 Total Dust
Calcium Carbonate	1317-65-3	3 – 15%	10 mg/m^3	5 mg/m^3 Respirable Dust 15 mg/m^3 Total Dust
Graphite	7782-42-5	1 - 5%	2 mg/m^3	15 mppcf
Crystalline Silica in the form of Quartz (Naturally Occurring) Total Dust Respirable	14808-60-7	< 2.0%	0.025 mg/m^3	<u>30 mg/m^3</u> %SiO2 + 2 <u>10 mg/m^3</u> %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flash Point/Range (F): Not Determined
Flash Point/Range (C): Not Determined
Flash Point Method: Not Determined
Autoignition Temperature (F): Not Determined
Autoignition Temperature (C): Not Determined
Flammability Limits in Air - Lower (%): Not Determined
Flammability Limits in Air - Upper (%): Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Use with adequate ventilation to keep exposures below recommended limits. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Health 1*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	This product contains quartz, which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Wash hands after use. Material is slippery when wet.
Storage Information	Store away from oxidizers. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 3.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Protective gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Tan, Light Grey
Odor:	Odorless
pH:	7 – 10.5
Specific Gravity @ 20 C (Water=1):	1.7 – 2.65
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	44 - 58
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of Carbon. Carbon monoxide and carbon dioxide. Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).

Additional Guidelines Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Rout of Exposure	Eye or skin contact, inhalation
Inhalation	Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC Group 2A).
Skin Contact	May cause mechanical skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	None Known
Aggravated Medical Conditions	Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity Cancer Status: In 2011, The International Agency for Research on Cancer (IARC) concluded that crystalline silica in the form of quartz or cristobalite dust is carcinogenic to humans (IARC Group 1). Prolonged inhalation of silica dust may result in silicosis, a progressive, disabling, and sometimes fatal, lung disease. Avoid creating dusty conditions and use a NIOSH/MSHA approved dust respirator when Threshold limit Values (TLVs) may be exceeded.

Other Information

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 100 volume C (2011).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation
ICAO/IATA Not restricted

Sea Transportation
IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not Applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this SDS
Section 1

Additional Information

For additional information on the use of this product, contact your local Metalcasting Performance Additives representative.

For questions about the Safety Data Sheet for this or other Metalcasting Performance Additives products, contact EHS&Q Coordinator at 1-319-235-1900.

Disclaimer Statement

As of the date of preparation of this document, the forgoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state law(s). This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF SDS*****

IMERYS
Metalcasting Solutions

SAFETY DATA SHEET

Product Trade Name: **IKOQUICK PM1 PREMIX™ FRITZ WINTER**

Revision Date: 20-SEP-2016

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name:	IKOQUICK PM1 Premix™ FRITZ WINTER
Synonyms:	None
Chemical Family:	Mineral
Application:	Additive
Manufacturer/Supplier	S&B Industrial Minerals N.A., Inc. 100 Mansell Ct., Roswell, GA 30076 Telephone: (319) 235-1900 Fax: (319) 232-7966 Emergency Telephone: (800) 424-9300 Call Chemtrec
Prepared By	EHS&Q Coordinator Telephone: 1-319-235-1900

2. HAZARDS IDENTIFICATION

Classification: STOT RE1

Signal Word: **DANGER**

Hazard Statement: Causes damage to lungs through prolonged or repeated exposure via inhalation.

Precautionary statements:
Do not breathe dust
In case of inadequate ventilation wear respiratory protection
Dispose of contents/containers in accordance with local regulation

Other: Long term exposure can cause lung injury (silicosis). IARC and NTP have determined that crystalline silica inhaled from occupational sources can cause cancer in humans. Risk of injury is dependent on the duration and level of exposure.

3. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Bentonite	1302-78-9	61% - 71%		Particulates Not Otherwise Regulated Respirable dust 15 mg/m^3 Total dust 5 mg/m^3
Coal Dust (Quartz) Respirable Fraction < 5% SiO_2	68409-95-0	27% -33%	0.9 mg/m^3	2.4 mg/m^3
Graphite	7782-42-5	< 2%	2 mg/m^3	15 mppcf
Crystalline Silica in the form of Quartz(Naturally occurring) Respirable dust Total dust	14808-60-7	1 – 5%	0.025 mg/m^3	$\frac{10 \text{ mg/m}^3}{\%SiO2 +2}$ $\frac{30 \text{ mg/m}^3}{\%SiO2 + 2}$
Crystalline silica, cristobalite (Naturally occurring) Respirable dust	14464-46-1	0 -1%	0.025 mg/m^3	1/2 x $\frac{10 \text{ mg/m}^3}{\%SiO2 + 2}$

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flash Point/Range (F): Not Determined
Flash Point/Range (C): Not Determined
Flash Point Method: Not Determined
Autoignition Temperature (F): Not Determined
Autoignition Temperature (C): Not Determined
Flammability Limits in Air - Lower (%): Not Determined
Flammability Limits in Air - Upper (%): Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards	This product contains coal. At high temperatures toxic hydrocarbon gases may be formed; use with adequate ventilation to keep exposures below recommended limits. Good housekeeping practices are required to minimize this potential. Material becomes slippery when wet.
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Health 1*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	This product contains quartz, which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Wash hands after use. Material is slippery when wet.
Storage Information	Store away from oxidizers. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 3.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Impervious rubber gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Light Gray to Dark Gray
Odor:	Odorless
pH:	7 - 10
Specific Gravity @ 20 C (Water=1):	1.7 – 2.65
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	44 - 58
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Various oxides of Carbon, and possibly sulfur dioxide. At elevated temperatures toxic hydrocarbons may be formed.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Rout of Exposure	Eye or skin contact, inhalation
Inhalation	Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC Group 2A).
Skin Contact	May cause mechanical skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	None Known
Aggravated Medical Conditions	Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity Cancer Status: In 2011, The International Agency for Research on Cancer (IARC) concluded that crystalline silica in the form of quartz or cristobalite dust is carcinogenic to humans (IARC Group 1). Prolonged inhalation of silica dust may result in silicosis, a progressive, disabling, and sometimes fatal, lung disease. Avoid creating dusty conditions and use a NIOSH/MSHA approved dust respirator when Threshold limit Values (TLVs) may be exceeded.

Other Information

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 100 volume C (2011).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation
ICAO/IATA Not restricted

Sea Transportation
IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not Applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	Product contains one or more components not listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Sections 1,2,11,16

Additional Information

For additional information on the use of this product, contact your local Metalcasting Additives representative.

For questions about the Safety Data Sheet for this or other Metalcasting Additives products, contact EHS&Q Coordinator at 1-319-235-1900.

Disclaimer Statement

As of the date of preparation of this document, the forgoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state law(s). This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF SDS*****

ASKCHEMICALS
We advance your casting

Safety Data Sheet
ZIP-SLIP™ LR57HP RELEASE AGENT

Version 1.1 | Revision Date 02/08/2019 | Print Date 02/28/2020

SECTION 1. IDENTIFICATION

Product name : ZIP-SLIP™ LR57HP RELEASE AGENT
Material : 851625

Manufacturer or supplier's details

Company : ASK CHEMICALS LLC
Address : 495 Metro Place South Suite 250
Dublin, OH 43017
United States of America
Emergency telephone number : 1-855-ASK4YOU (1-855-275-4968)
E-mail address : EHSRequests.usa@ask-chemicals.com

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Not a hazardous substance or mixture.

GHS label elements

Not a hazardous substance or mixture.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous components

Chemical name	CAS-No.	Concentration (%)
DISTILLATES (PETROLEUM), HYDROTREATED HEAVY PARAFFINIC	64742-54-7	>= 90 - <= 100
OLEIC ACID	112-80-1	>= 5 - < 10

SECTION 4. FIRST AID MEASURES

General advice : Do not leave the victim unattended.

If inhaled : Remove person to fresh air. If signs/symptoms continue, get medical attention.

If unconscious place in recovery position and seek medical advice.
If symptoms persist, call a physician.

In case of skin contact : Flush skin with large amounts of water. If irritation develops and persists, get medical attention.

In case of eye contact : Flush eyes with water at least 15 minutes. Get medical attention if eye irritation develops or persists.

Remove contact lenses.
Protect unharmed eye.
If eye irritation persists, consult a specialist.

If swallowed : If swallowed, DO NOT induce vomiting unless directed to do so by medical personnel.

Keep respiratory tract clear.
Do not give milk or alcoholic beverages.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.

Most important symptoms and effects, both acute and delayed : None known.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Further information : Standard procedure for chemical fires.
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Special protective equipment for firefighters : Wear self contained breathing apparatus for fire fighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Methods and materials for containment and cleaning up : Wipe up with absorbent material (e.g. cloth, fleece).
Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion : Normal measures for preventive fire protection.

Advice on safe handling : For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the application area.

Conditions for safe storage : Electrical installations / working materials must comply with the technological safety standards.

Materials to avoid : No materials to be especially mentioned.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type	Control parame-	Basis

		(Form of exposure)	ters / Permissible concentration	
DISTILLATES (PETROLEUM), HYDROTREATED HEAVY PARAFFINIC	64742-54-7	TWA (Mist)	5 mg/m3	OSHA Z-1
		TWA (Inhalable fraction)	5 mg/m3	ACGIH
		TWA	5 mg/m3	OSHA P0
		TWA (Mist)	5 mg/m3	NIOSH REL
		ST (Mist)	10 mg/m3	NIOSH REL
		TWA (Mist)	5 mg/m3	OSHA P0
		PEL (particulate)	5 mg/m3	CAL PEL

Personal protective equipment

Respiratory protection : No personal respiratory protective equipment normally required.

Eye protection : Safety glasses

Skin and body protection : Protective suit

Hygiene measures : General industrial hygiene practice.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid

Colour : no data available

Odour : no data available

Odour Threshold : no data available

pH : no data available

Melting point : no data available

Boiling point : no data available

Flash point : 239 °C

Evaporation rate : no data available

Flammability (solid, gas) : no data available

Burning rate : no data available

Upper explosion limit : no data available

Lower explosion limit : no data available

Vapour pressure : no data available

Relative vapour density	:	no data available
Relative density	:	no data available
Density	:	0.846 g/cm3 (20 °C)
Bulk density	:	no data available
Solubility(ies)		
Water solubility	:	no data available
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Decomposition temperature	:	no data available
Viscosity		
Viscosity, dynamic	:	no data available
Viscosity, kinematic	:	no data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No decomposition if stored and applied as directed.
Chemical stability	:	Stable No decomposition if stored and applied as directed.
Possibility of hazardous reactions	:	Stable under recommended storage conditions. No hazards to be specially mentioned.
Conditions to avoid	:	no data available

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Components:

DISTILLATES (PETROLEUM), HYDROTREATED HEAVY PARAFFINIC:

Acute oral toxicity	:	LD50 (rat): > 15,000 mg/kg
Acute dermal toxicity	:	LD50 (rabbit): > 5,000 mg/kg

OLEIC ACID:

Acute oral toxicity	:	LD50 (rat): 25,000 mg/kg

Skin corrosion/irritation

Components:

DISTILLATES (PETROLEUM), HYDROTREATED HEAVY PARAFFINIC:
Assessment: Mild skin irritation
Result: Mild skin irritation

OLEIC ACID:
Assessment: Mild skin irritation
Result: Mild skin irritation

Serious eye damage/eye irritation

Components:

DISTILLATES (PETROLEUM), HYDROTREATED HEAVY PARAFFINIC:
Result: No eye irritation
Assessment: No eye irritation

OLEIC ACID:
Result: Mild eye irritation
Assessment: Mild eye irritation

Carcinogenicity

IARC	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Further information

Product:
Remarks: no data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity
No data available

Persistence and degradability
No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
Additional ecological information	:	no data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with all applicable local, state and federal regulations.
Contaminated packaging	:	Empty containers should be taken to an approved waste handling site for recycling or disposal.

SECTION 14. TRANSPORT INFORMATION

REGULATION
U.S. DOT - ROAD
Not regulated as a dangerous good

U.S. DOT - RAIL
Not regulated as a dangerous good

U.S. DOT - INLAND WATERWAYS
Not regulated as a dangerous good

TRANSPORT CANADA - ROAD
Not regulated as a dangerous good

TRANSPORT CANADA - RAIL
Not regulated as a dangerous good

TRANSPORT CANADA - INLAND WATERWAYS
Not regulated as a dangerous good

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES
Not regulated as a dangerous good

INTERNATIONAL MARITIME DANGEROUS GOODS
Not regulated as a dangerous good

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO
Not regulated as a dangerous good

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards	:	No SARA Hazards
SARA 302	:	This material does not contain any components with a section 302 EHS TPQ.
SARA 313	:	SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
California Prop 65		This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

The components of this product are reported in the following inventories:

TSCA	:	On TSCA Inventory
DSL	:	All components of this product are on the Canadian DSL.
AICS	:	On the inventory, or in compliance with the inventory
NZIoC	:	On the inventory, or in compliance with the inventory
ENCS	:	Not in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PICCS	:	On the inventory, or in compliance with the inventory
IECSC	:	On the inventory, or in compliance with the inventory

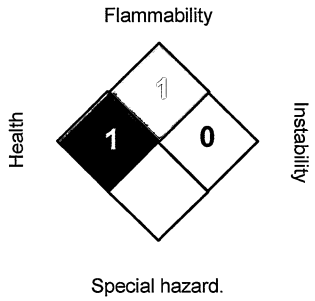
Inventories

AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TSCA (USA)

SECTION 16. OTHER INFORMATION

Further information

NFPA:



HMIS III:

HEALTH	1
FLAMMABILITY	1
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by ASK's Environmental Health and Safety Department-- EHSrequests.USA@ask-chemicals.com.

Revision Date : 02/08/2019

Safety Data Sheet
ISOCURE FOCUS I 109 BINDER TW936

SECTION 1. IDENTIFICATION

Product name	:	ISOCURE FOCUS I 109 BINDER TW936
Product code	:	R0389443
Material	:	769169

Manufacturer or supplier's details

Company	:	ASK Chemicals L.P.
Address	:	495 Metro Place South Suite 250 Dublin, OH 43017 United States of America
Emergency telephone number	:	1-855-ASK4YOU (1-855-275-4968)
E-mail address	:	EHSRequests.usa@ask-chemicals.com

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Skin irritation	:	Category 2
Serious eye damage	:	Category 1
Germ cell mutagenicity	:	Category 2
Specific target organ toxicity - repeated exposure	:	Category 2

GHS Label element

Hazard pictograms :

Signal word : Danger

Hazard statements : H315 Causes skin irritation.
H318 Causes serious eye damage.
H341 Suspected of causing genetic defects.
H373 May cause damage to organs through prolonged or repeated exposure.

Precautionary statements : **Prevention:**
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P280 Wear eye protection/ face protection.
P280 Wear protective gloves.
P281 Use personal protective equipment as required.
Response:
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water

for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P310 Immediately call a POISON CENTER or doctor/ physician.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P362 Take off contaminated clothing and wash before reuse.
Storage:
P405 Store locked up.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous components

Chemical Name	CAS-No.	Concentration (%)
DIMETHYL GLUTARATE	1119-40-0	>= 10 - < 20
RAPESEED OIL FATTY ACIDS, METHYL ESTERS	73891-99-3	>= 10 - < 20
DIMETHYL SUCCINATE	106-65-0	>= 5 - < 10
DIMETHYL ADIPATE	627-93-0	>= 5 - < 10
PHENOL	108-95-2	>= 1 - < 5
DIISOBUTYL PHTHALATE	84-69-5	>= 1 - < 5

SECTION 4. FIRST AID MEASURES

General advice	:	Consult a physician.
If inhaled	:	Remove person to fresh air. If signs/symptoms continue, get medical attention.
In case of skin contact	:	Take off contaminated clothing and shoes immediately. If on skin, rinse well with water. If on clothes, remove clothes.
In case of eye contact	:	Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
If swallowed	:	If swallowed, DO NOT induce vomiting unless directed to do so by medical personnel.
Most important symptoms and effects, both acute and delayed	:	None known.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Specific hazards during firefighting	:	Do not use a solid water stream as it may scatter and spread fire. Cool closed containers exposed to fire with water spray.
Special protective equipment for firefighters	:	In the event of fire, wear self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment. Ensure adequate ventilation. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Material can create slippery conditions.
Environmental precautions	:	Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	:	Keep in suitable, closed containers for disposal. Clean contaminated floors and objects thoroughly while observing environmental regulations.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling	:	Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
PHENOL	108-95-2	TWA	5 ppm	ACGIH
		TWA	5 ppm 19 mg/m3	NIOSH REL
		C	15.6 ppm 60 mg/m3	NIOSH REL
		TWA	5 ppm 19 mg/m3	OSHA Z-1
		TWA	5 ppm 19 mg/m3	OSHA P0

Personal protective equipment

Eye protection	:	Wear face-shield and protective suit for abnormal processing problems.

Proper eye protection according to ANSI Z87.1 must be worn.

Protective measures	:	Wear suitable protective equipment. Avoid contact with skin. When using do not eat, drink or smoke.
Hygiene measures	:	Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Remove contaminated clothing and protective equipment before entering eating areas.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Colour	:	amber
Odour	:	mild
Odour Threshold	:	no data available
pH	:	no data available
Melting point	:	no data available
Boiling point	:	181.75 °C (1,013 hPa) Calculated Phase Transition Liquid/Gas
Flash point	:	> 93.4 °C Method: Seta closed cup
Evaporation rate	:	no data available
Flammability (solid, gas)	:	no data available
Burning rate	:	no data available
Upper explosion limit	:	8.6 %(V) Calculated Explosive Limit
Lower explosion limit	:	0.9 %(V) Calculated Explosive Limit
Vapour pressure	:	3 hPa (25 °C) Calculated Vapor Pressure
Relative vapour density	:	no data available
Relative density	:	1.106 (77.00 °F)
Density	:	1.106 g/cm3 (77.00 °F)
Bulk density	:	no data available

Solubility(ies)
Water solubility : no data available

Solubility in other solvents : no data available

Partition coefficient: n-octanol/water : no data available

Auto-ignition temperature : no data available

Decomposition temperature : no data available

Viscosity
Viscosity, dynamic : 480 mPa.s

Viscosity, kinematic : no data available

SECTION 10. STABILITY AND REACTIVITY

Chemical stability : Stable

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Skin Absorption

Acute toxicity

Product:

Acute oral toxicity : Acute toxicity estimate: 2,806 mg/kg
Method: Calculation method

Acute inhalation toxicity : Acute toxicity estimate: 34.96 mg/l
Exposure time: 4 h
Test atmosphere: vapour
Method: Calculation method

Acute dermal toxicity : Acute toxicity estimate: > 5,000 mg/kg
Method: Calculation method

Components:

DIMETHYL GLUTARATE:
Acute oral toxicity : LD50 (rat): 8,191 mg/kg

Acute inhalation toxicity : LC50 (rat): > 5.6 mg/l
Exposure time: 4 h

RAPESEED OIL FATTY ACIDS, METHYL ESTERS:
Acute oral toxicity : LD50 (rat): > 2,000 mg/kg

DIMETHYL SUCCINATE:
Acute oral toxicity : LD50 (rat): > 5,000 mg/kg

Acute dermal toxicity : LD50 (rabbit): > 5,000 mg/kg

PHENOL:

Acute oral toxicity	:	LD50 (rat): 317 mg/kg Acute toxicity estimate: 100 mg/kg Method: Converted acute toxicity point estimate
Acute inhalation toxicity	:	LC50 (rat): 0.316 mg/l Exposure time: 4 h Test atmosphere: vapour
Acute dermal toxicity	:	LD50 (rabbit): 850 mg/kg Acute toxicity estimate: 300 mg/kg Method: Converted acute toxicity point estimate

DIISOBUTYL PHTHALATE:

Acute oral toxicity	:	LD50 (rat): 15,000 mg/kg LD50 (mouse): 12,800 mg/kg
Acute toxicity (other routes of administration)	:	LD 50 (Mouse): 4.5 g/kg Application Route: Intraperitoneal Remarks: This data record is no longer present in the Ariel database LD 50 (Rat): 3.8 g/kg Application Route: Intraperitoneal Remarks: This data record is no longer present in the Ariel database

Skin corrosion/irritation

Components:

DIMETHYL GLUTARATE:
Assessment: Irritating to skin.
Result: Irritating to skin.

RAPESEED OIL FATTY ACIDS, METHYL ESTERS:
Assessment: Mild skin irritation
Result: Mild skin irritation

DIMETHYL SUCCINATE:
Assessment: No skin irritation
Result: No skin irritation

DIMETHYL ADIPATE:
Assessment: Mild skin irritation
Result: Mild skin irritation

PHENOL:
Assessment: Corrosive
Result: Corrosive

Assessment: Severe skin irritation
Result: Severe skin irritation

DIISOBUTYL PHTHALATE:
Assessment: Mild skin irritation
Result: Mild skin irritation

Serious eye damage/eye irritation

Components:
DIMETHYL GLUTARATE:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

RAPESEED OIL FATTY ACIDS, METHYL ESTERS:
Result: No eye irritation
Assessment: No eye irritation

DIMETHYL SUCCINATE:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

DIMETHYL ADIPATE:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

PHENOL:
Result: Blindness
Assessment: Blindness

Result: Irritating to eyes.
Assessment: Irritating to eyes.

Result: Risk of serious damage to eyes.
Assessment: Risk of serious damage to eyes.

DIISOBUTYL PHTHALATE:
Result: Mild eye irritation
Assessment: Mild eye irritation

Carcinogenicity

IARC	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Further information

Components:
PHENOL:

Remarks: Central nervous system

Remarks: Blood

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

PHENOL:

Toxicity to fish : LC 50 (Rainbow trout,donaldson trout (Oncorhynchus mykiss)): 7.5 - 14 mg/l
Exposure time: 96 h
Method: Static
Remarks: Mortality

LC 50 (Danio rerio (zebra fish)): 27.8 mg/l
Exposure time: 96 h
Method: Static
Remarks: Mortality

Toxicity to daphnia and other aquatic invertebrates : EC 50 (Water flea (Daphnia magna)): 4.24 - 10.7 mg/l
Exposure time: 48 h
Method: Static
Remarks: Intoxication

Persistence and degradability

Components:

DIMETHYL SUCCINATE:

Biodegradability : Remarks: Readily biodegradable

Bioaccumulative potential

Components:

DIMETHYL SUCCINATE:

Partition coefficient: n-octanol/water : log Pow: 0.35

DIMETHYL ADIPATE:

Partition coefficient: n-octanol/water : log Pow: 1.03

PHENOL:

Partition coefficient: n-octanol/water : log Pow: 1.46

DIISOBUTYL PHTHALATE:

Partition coefficient: n-octanol/water : log Pow: 4.11

Mobility in soil

No data available

Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with all applicable local, state and federal regulations. Dispose of wastes in an approved waste disposal facility.

SECTION 14. TRANSPORT INFORMATION

REGULATION
U.S. DOT - ROAD
Not regulated as a dangerous good

U.S. DOT - RAIL
Not regulated as a dangerous good

U.S. DOT - INLAND WATERWAYS
Not regulated as a dangerous good

TRANSPORT CANADA - ROAD
Not regulated as a dangerous good

TRANSPORT CANADA - RAIL
Not regulated as a dangerous good

TRANSPORT CANADA - INLAND WATERWAYS
Not regulated as a dangerous good

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES
Not regulated as a dangerous good

INTERNATIONAL MARITIME DANGEROUS GOODS
Not regulated as a dangerous good

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO
Not regulated as a dangerous good

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
PHENOL	108-95-2	1000	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 304 Extremely Hazardous Substances Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
PHENOL	108-95-2	1000	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 311/312 Hazards : Acute Health Hazard

SARA 302 : The following components are subject to reporting levels established by SARA Title III, Section 302:

PHENOL 108-95-2 3.564 %

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

PHENOL 108-95-2 3.564 %

California Prop 65 WARNING! This product contains a chemical known to the State of California to cause cancer.

FORMALDEHYDE 50-00-0
ETHYL CARBAMATE 51-79-6

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

METHANOL 67-56-1
ETHYL CARBAMATE 51-79-6

The components of this product are reported in the following inventories:

TSCA : On TSCA Inventory
DSL : All components of this product are on the Canadian DSL.
AUSTR : On the inventory, or in compliance with the inventory
NZIOC : Not in compliance with the inventory
ENCS : Not in compliance with the inventory
KOREA : On the inventory, or in compliance with the inventory
PHIL : Not in compliance with the inventory
CHINA : On the inventory, or in compliance with the inventory

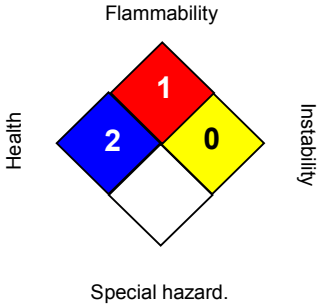
Inventories

AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TSCA (USA)

SECTION 16. OTHER INFORMATION

Further information

NFPA:



HMIS III:

HEALTH	2*
FLAMMABILITY	1
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by ASK's Environmental Health and Safety Department-- EHSrequests.USA@ask-chemicals.com.

Revision Date : 05/26/2015

Safety Data Sheet
ISOCURE FOCUS II 209 BINDER TW936

SECTION 1. IDENTIFICATION

Product name	:	ISOCURE FOCUS II 209 BINDER TW936
Product code	:	R0389447
Material	:	769170

Manufacturer or supplier's details

Company	:	ASK Chemicals L.P.
Address	:	495 Metro Place South Suite 250 Dublin, OH 43017 United States of America
Emergency telephone number	:	1-855-ASK4YOU (1-855-275-4968)
E-mail address	:	EHSRequests.usa@ask-chemicals.com

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Acute toxicity (Inhalation)	:	Category 4
Skin irritation	:	Category 2
Eye irritation	:	Category 2A
Respiratory sensitisation	:	Category 1
Skin sensitisation	:	Category 1

GHS Label element

Hazard pictograms :

Signal word : Danger

Hazard statements :
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Precautionary statements :
Prevention:
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P272 Contaminated work clothing should not be allowed out of the workplace.
P280 Wear eye protection/ face protection.
P280 Wear protective gloves.
P285 In case of inadequate ventilation wear respiratory protection.

Response:
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P342 + P311 If experiencing respiratory symptoms: Call a POISON CENTER or doctor/ physician.
P362 Take off contaminated clothing and wash before reuse.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous components

Chemical Name	CAS-No.	Concentration (%)
POLYMETHYLENE POLYPHENYL ISOCYANATE	9016-87-9	>= 30 - < 50
4,4'-DIPHENYLMETHANE DIISOCYANATE	101-68-8	>= 30 - < 50
RAPESEED OIL FATTY ACIDS, METHYL ESTERS	73891-99-3	>= 20 - < 30
METHYLENE DIPHENYLISOCYANATE	26447-40-5	>= 1 - < 5

SECTION 4. FIRST AID MEASURES

General advice	:	Consult a physician.
If inhaled	:	Call a physician or poison control centre immediately. If breathed in, move person into fresh air.
In case of skin contact	:	Take off contaminated clothing and shoes immediately. If on skin, rinse well with water. If on clothes, remove clothes.
In case of eye contact	:	Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
If swallowed	:	If swallowed, DO NOT induce vomiting unless directed to do so by medical personnel.
Most important symptoms and effects, both acute and delayed	:	None known.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Specific hazards during firefighting	:	Do not use a solid water stream as it may scatter and spread fire. Burning produces irritant fumes. Cool closed containers exposed to fire with water spray.
Further information	:	In the event of fire and/or explosion do not breathe fumes.
Special protective equipment for firefighters	:	In the event of fire, wear self-contained breathing apparatus. Exposure to decomposition products may be a hazard to health.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment. Ensure adequate ventilation. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Use the indicated respiratory protection if the occupational exposure limit is exceeded and/or in case of product release (dust). Material can create slippery conditions.
Environmental precautions	:	Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	:	Keep in suitable, closed containers for disposal. Clean contaminated floors and objects thoroughly while observing environmental regulations.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling	:	Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. In case of insufficient ventilation, wear suitable respiratory equipment.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis

4,4'-DIPHENYLMETHANE DIISOCYANATE	101-68-8	TWA	0.005 ppm	ACGIH
		TWA	0.005 ppm 0.05 mg/m3	NIOSH REL
		C	0.2 ppm 0.2 mg/m3	NIOSH REL
		C	0.02 ppm 0.2 mg/m3	OSHA Z-1
		C	0.02 ppm 0.2 mg/m3	OSHA P0

Personal protective equipment

Eye protection : Safety goggles

Protective measures : Wear suitable protective equipment.
Avoid contact with skin.
When using do not eat, drink or smoke.

Hygiene measures : Avoid contact with skin, eyes and clothing.
Wash hands before breaks and immediately after handling the product.
Remove contaminated clothing and protective equipment before entering eating areas.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid

Colour : brown

Odour : musty

Odour Threshold : no data available

pH : no data available

Melting point : no data available

Boiling point : 196 °C
(6.666 hPa)
Calculated Phase Transition Liquid/Gas

Flash point : > 93.4 °C

Evaporation rate : no data available

Flammability (solid, gas) : no data available

Burning rate : no data available

Upper explosion limit : no data available

Lower explosion limit : no data available

Vapour pressure : 3 hPa (25 °C)
Calculated Vapor Pressure

Relative vapour density	:	no data available
Relative density	:	1.145 (77.00 °F)
Density	:	1.145 g/cm3 (77.00 °F)
Bulk density	:	no data available
Solubility(ies)		
Water solubility	:	no data available
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Decomposition temperature	:	no data available
Viscosity		
Viscosity, dynamic	:	31 mPa.s
Viscosity, kinematic	:	no data available

SECTION 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable
Incompatible materials	:	water

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Inhalation
Skin Absorption

Acute toxicity

Product:

Acute inhalation toxicity	:	Acute toxicity estimate: 14.53 mg/l Exposure time: 4 h Test atmosphere: vapour Method: Calculation method

Components:

POLYMETHYLENE POLYPHENYL ISOCYANATE:

Acute oral toxicity	:	LD50 (rat): > 10,000 mg/kg
Acute inhalation toxicity	:	LC50 (rat): 0.369 - 0.49 mg/l Exposure time: 4 h

Acute dermal toxicity : LD50 (rabbit): > 10,000 mg/kg

LD50 (rabbit): 11,300 mg/kg

4,4'-DIPHENYLMETHANE DIISOCYANATE:
Acute oral toxicity : LD50 (rat): 9,200 mg/kg

Acute inhalation toxicity : LC50 (rat): > 2.24 mg/l
Exposure time: 1 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 403

Acute dermal toxicity : LD50 (rabbit): > 7,900 mg/kg

RAPESEED OIL FATTY ACIDS, METHYL ESTERS:
Acute oral toxicity : LD50 (rat): > 2,000 mg/kg

METHYLENE DIPHENYLISOCYANATE:
Acute oral toxicity : LD50 (rat): > 15,800 mg/kg

Acute inhalation toxicity : LC50 (rat): 0.49 mg/l
Exposure time: 4 h

Acute dermal toxicity : LD50 (rabbit): > 5,010 mg/kg

Skin corrosion/irritation

Components:
POLYMETHYLENE POLYPHENYL ISOCYANATE:
Assessment: Irritating to skin.
Result: Irritating to skin.

4,4'-DIPHENYLMETHANE DIISOCYANATE:
Assessment: Irritating to skin.
Result: Irritating to skin.

RAPESEED OIL FATTY ACIDS, METHYL ESTERS:
Assessment: Mild skin irritation
Result: Mild skin irritation

METHYLENE DIPHENYLISOCYANATE:
Assessment: Irritating to skin.
Result: Irritating to skin.

Serious eye damage/eye irritation

Components:
POLYMETHYLENE POLYPHENYL ISOCYANATE:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

4,4'-DIPHENYLMETHANE DIISOCYANATE:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

RAPESEED OIL FATTY ACIDS, METHYL ESTERS:
Result: No eye irritation
Assessment: No eye irritation

METHYLENE DIPHENYLISOCYANATE:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

Respiratory or skin sensitisation

Components:
POLYMETHYLENE POLYPHENYL ISOCYANATE:
Assessment: May cause sensitisation by skin contact.

Assessment: May cause sensitisation by inhalation.

4,4'-DIPHENYLMETHANE DIISOCYANATE:
Assessment: May cause sensitisation by inhalation.

Assessment: May cause sensitisation by skin contact.

METHYLENE DIPHENYLISOCYANATE:
Assessment: May cause sensitisation by inhalation.

Assessment: May cause sensitisation by skin contact.

Carcinogenicity

IARC	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Further information

Components:
4,4'-DIPHENYLMETHANE DIISOCYANATE:
Remarks: Lungs

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity
No data available

Persistence and degradability
No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with all applicable local, state and federal regulations. Dispose of wastes in an approved waste disposal facility.

SECTION 14. TRANSPORT INFORMATION

REGULATION
U.S. DOT - ROAD
Not regulated as a dangerous good

U.S. DOT - RAIL
Not regulated as a dangerous good

U.S. DOT - INLAND WATERWAYS
Not regulated as a dangerous good

TRANSPORT CANADA - ROAD
Not regulated as a dangerous good

TRANSPORT CANADA - RAIL
Not regulated as a dangerous good

TRANSPORT CANADA - INLAND WATERWAYS
Not regulated as a dangerous good

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES
Not regulated as a dangerous good

INTERNATIONAL MARITIME DANGEROUS GOODS
Not regulated as a dangerous good

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO

Not regulated as a dangerous good

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
4,4'-DIPHENYLMETHANE DIISOCYANATE	101-68-8	5000	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 304 Extremely Hazardous Substances Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
PHOSPHORUS OXYCHLORIDE	10025-87-3	1000	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 311/312 Hazards : Acute Health Hazard

SARA 302 : SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

POLYMETHYLENE POLYPHENYL ISOCYANATE	9016-87-9	37.85 %
4,4'-DIPHENYLMETHANE DIISOCYANATE	101-68-8	34.065 %

California Prop 65 This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

The components of this product are reported in the following inventories:

TSCA : On TSCA Inventory
DSL : This product contains the following components listed on the Canadian NDSL. All other components are on the Canadian DSL.
AUSTR : Not in compliance with the inventory
NZIOC : On the inventory, or in compliance with the inventory
ENCS : On the inventory, or in compliance with the inventory

KOREA	:	Not in compliance with the inventory
PHIL	:	On the inventory, or in compliance with the inventory
CHINA	:	Not in compliance with the inventory

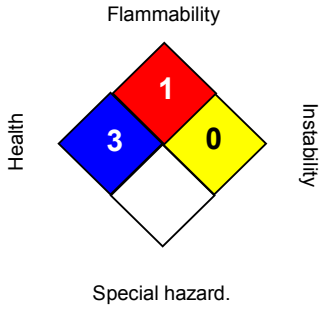
Inventories

AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TSCA (USA)

SECTION 16. OTHER INFORMATION

Further information

NFPA:



HMIS III:

HEALTH	2*
FLAMMABILITY	1
PHYSICAL HAZARD	1

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by ASK's Environmental Health and Safety Department-- EHSrequests.USA@ask-chemicals.com.

Revision Date : 05/26/2015

SECTION 1. IDENTIFICATION

Product name	:	ISOCURE™ 706 CATALYST
Material	:	590163

Manufacturer or supplier's details

Company	:	ASK Chemicals L.P.
Address	:	495 Metro Place South Suite 250 Dublin, OH 43017 United States of America
Emergency telephone number	:	1-855-ASK4YOU (1-855-275-4968)
E-mail address	:	EHSRequests.usa@ask-chemicals.com

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids	:	Category 2
Acute toxicity (Oral)	:	Category 4
Skin irritation	:	Category 2
Serious eye damage	:	Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H225 Highly flammable liquid and vapour.
H302 Harmful if swallowed.
H315 Causes skin irritation.
H318 Causes serious eye damage.

Precautionary statements : **Prevention:**
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P280 Wear protective gloves/ eye protection/ face protection.
Response:
P301 + P312 IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.

P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 Immediately call a POISON CENTER or doctor/ physician.
P330 Rinse mouth.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P362 Take off contaminated clothing and wash before reuse.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
Storage:
P403 + P235 Store in a well-ventilated place. Keep cool.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Hazardous components

Chemical name	CAS-No.	Concentration (%)
DIMETHYLPROPYLAMINE	926-63-6	>= 90 - <= 100

SECTION 4. FIRST AID MEASURES

General advice : Do not leave the victim unattended.

If inhaled : Remove person to fresh air. If signs/symptoms continue, get medical attention.

If unconscious place in recovery position and seek medical advice.
If symptoms persist, call a physician.

In case of skin contact : Flush skin with large amounts of water. If irritation develops and persists, get medical attention.

In case of eye contact : Remove contact lenses.
Protect unharmed eye.
If eye irritation persists, consult a specialist.

If swallowed : If swallowed, DO NOT induce vomiting unless directed to do so by medical personnel.

Keep respiratory tract clear.
Do not give milk or alcoholic beverages.
Never give anything by mouth to an unconscious person.

If symptoms persist, call a physician.

Most important symptoms and effects, both acute and delayed	:	None known.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Carbon dioxide (CO2) Alcohol-resistant foam Water spray Dry chemical
Further information	:	Standard procedure for chemical fires. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Special protective equipment for firefighters	:	Wear self contained breathing apparatus for fire fighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Methods and materials for containment and cleaning up	:	Neutralise with acid. Wipe up with absorbent material (e.g. cloth, fleece). Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion	:	Normal measures for preventive fire protection.
Advice on safe handling	:	For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area.
Conditions for safe storage	:	Electrical installations / working materials must comply with the technological safety standards.
Materials to avoid	:	No materials to be especially mentioned.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection	:	No personal respiratory protective equipment normally required.
Eye protection	:	Safety glasses

Skin and body protection	:	Protective suit
Hygiene measures	:	General industrial hygiene practice.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Colour	:	colourless
Odour	:	amine-like
Odour Threshold	:	no data available
pH	:	ca. 11.2, 5 % (20 °C)
Melting point	:	ca. -40 °C
Boiling point	:	66.3 °C
Flash point	:	-11 °C Method: Closed Cup
Evaporation rate	:	no data available
Flammability (solid, gas)	:	no data available
Burning rate	:	no data available
Upper explosion limit	:	no data available
Lower explosion limit	:	no data available
Vapour pressure	:	172 mmHg (25 °C) Method: OECD Test Guideline 104
Relative vapour density	:	> 1 (Air = 1.0)
Relative density	:	0.702 (25 °C)
Density	:	0.702 g/cm3 (25 °C)
Bulk density	:	no data available
Solubility(ies)		
Water solubility	:	soluble
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available

Auto-ignition temperature	:	165 °C
Decomposition temperature	:	no data available
Viscosity		
Viscosity, dynamic	:	0.36 mPa.s (20 °C)
Viscosity, kinematic	:	no data available
Molecular weight	:	87.16 g/mol

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No decomposition if stored and applied as directed.
Chemical stability	:	Stable
Possibility of hazardous reactions	:	Stable under recommended storage conditions.
Conditions to avoid	:	no data available
Incompatible materials	:	Acids

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Product:

Acute oral toxicity : LD 50 (Rat): 507 mg/kg

Components:

DIMETHYLPROPYLAMINE:

Acute oral toxicity : LD50 (rat): 507 mg/kg

Acute dermal toxicity : LD 50 (Rabbit): 650 mg/kg

Skin corrosion/irritation

Product:

Assessment: Irritating to skin
Result: Irritating to skin

Components:

DIMETHYLPROPYLAMINE:

Assessment: Irritating to skin.
Result: Irritating to skin.

Serious eye damage/eye irritation

Product:

Result: Severely irritating to eyes
Assessment: Severely irritating to eyes

Components:

DIMETHYLPROPYLAMINE:
Result: Risk of serious damage to eyes.
Assessment: Risk of serious damage to eyes.

Germ cell mutagenicity

Components:

DIMETHYLPROPYLAMINE:

Genotoxicity in vitro	:	Method: Mutagenicity (Escherichia coli - reverse mutation assay) Result: negative

Carcinogenicity

IARC	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Further information

Product:

Remarks: no data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

DIMETHYLPROPYLAMINE:

Toxicity to fish	:	LC 50 (Brachydanio rerio): > 100 mg/l

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
Additional ecological information	:	no data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with all applicable local, state and federal regulations.
Contaminated packaging	:	Empty containers should be taken to an approved waste handling site for recycling or disposal.

SECTION 14. TRANSPORT INFORMATION

REGULATION
U.S. DOT - ROAD

UN/ID/NA number	:	UN2266
Proper shipping name	:	Dimethyl-N-propylamine
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

U.S. DOT - RAIL

UN/ID/NA number	:	UN2266
Proper shipping name	:	Dimethyl-N-propylamine
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

U.S. DOT - INLAND WATERWAYS

UN/ID/NA number	:	UN2266

Proper shipping name	:	Dimethyl-N-propylamine
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

TRANSPORT CANADA - ROAD

UN/ID/NA number	:	UN2266
Proper shipping name	:	DIMETHYL-N-PROPYLAMINE
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

TRANSPORT CANADA - RAIL

UN/ID/NA number	:	UN2266
Proper shipping name	:	DIMETHYL-N-PROPYLAMINE
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

TRANSPORT CANADA - INLAND WATERWAYS

UN/ID/NA number	:	UN2266
Proper shipping name	:	DIMETHYL-N-PROPYLAMINE
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES

UN/ID/NA number	:	UN2266
Proper shipping name	:	DIMETIL-N-PROPILAMINA
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

INTERNATIONAL MARITIME DANGEROUS GOODS

UN/ID/NA number	:	UN2266
Proper shipping name	:	N,N-DIMETHYLPROPYLAMINE

Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO

UN/ID/NA number	:	UN2266
Proper shipping name	:	Dimethyl-N-propylamine
Class	:	3
Subsidiary risk	:	(8)
Packing group	:	II
Flash point	:	-11 °C
Marine pollutant	:	no data available

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards	:	Acute Health Hazard Fire Hazard
SARA 302	:	SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313	:	SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
California Prop 65		This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

The components of this product are reported in the following inventories:

TSCA	:	On TSCA Inventory
DSL	:	This product contains the following components listed on the Canadian NDSL. All other components are on the Canadian DSL.

AICS	:	Not in compliance with the inventory
NZIoC	:	Not in compliance with the inventory
ENCS	:	Not in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PICCS	:	On the inventory, or in compliance with the inventory
IECSC	:	Not in compliance with the inventory

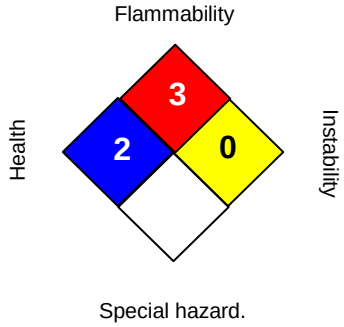
Inventories

AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TSCA (USA)

SECTION 16. OTHER INFORMATION

Further information

NFPA:



HMIS III:

HEALTH	2
FLAMMABILITY	3
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by ASK's Environmental Health and Safety Department-- EHSrequests.USA@ask-chemicals.com.

Revision Date : 04/05/2018

1. Identification

Product identifier

ACMOS 118-63

Recommended use of the chemical and restrictions on use

Relevant identified uses

Release agent for cold setting sand

Uses advised against

Consumer uses: Private households (= general public = consumers)
Sector of uses [SU]: 21
Do not use for private purposes (household).

Relevant identified uses - Further information:
Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of uses [SU]: 3
The product is intended for professional use.

Details of the supplier of the safety data sheet

Manufacturer

Company name:	ACMOS CHEMIE KG
Street:	Industriestrasse 49
Place:	D-28199 Bremen
Post-office box:	10 10 69 D-28010 Bremen
Telephone:	+49 (0)421-5189-0 Telefax: +49 (0)421-511415
e-mail:	acmos@acmos.com
Contact person:	Mr. Stephan Dryhaus
e-mail:	sds@acmos.com
Internet:	www.acmos.com
Responsible Department:	Laboratory (Division: Occupational- / Product security) - see under section 16
Emergency phone number:	01149 (0)551 19240 (Emergency information service / official advisory body: Giftinformationszentrum Nord, Universität Göttingen, 24 h from mo. - su.) Language(s) of Telephone Service: DE, EN

Supplier

Company name:	ACMOS CHEMIE KG
Street:	Industriestrasse 49
Place:	D-28199 Bremen
Post-office box:	10 10 69 D-28010 Bremen
Telephone:	+49 (0)421-5189-0 Telefax: +49 (0)421-511415
e-mail:	acmos@acmos.com
Contact person:	Mr. Stephan Dryhaus
e-mail:	sds@acmos.com
Internet:	www.acmos.com
Responsible Department:	Laboratory (Division: Occupational- / Product security) - see under section 16
Emergency phone number:	1-800-424-9300 (CHEMTREC - 24/7 - Within the USA and Canada) Language(s) of Telephone Service: EN, FR

2. Hazard(s) identification

Classification of the chemical

29 CFR Part 1910.1200

Flammable liquids: Flam. Liq. 2
Aspiration hazard: Asp. Tox. 1
Skin corrosion/irritation: Skin Irrit. 2
Specific target organ toxicity single exposure: STOT SE 3 (narcotic effects)

Label elements

29 CFR Part 1910.1200

Signal word: Danger

Pictograms:

Hazard statements

Highly flammable liquid and vapor
Causes skin irritation
May cause drowsiness or dizziness
May be fatal if swallowed and enters airways

Precautionary statements

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Avoid breathing spray.
Wash hands thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection.
If swallowed: Immediately call a poison center/doctor.
Do NOT induce vomiting.
If on skin: Wash with plenty of soap and water.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If skin irritation occurs: Get medical advice/attention.
Take off contaminated clothing and wash it before reuse.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Call a poison center/doctor if you feel unwell.
In case of fire: Use Water mist/Extinguishing powder/Foam/Carbon dioxide (CO2) to extinguish.
Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.
Dispose of contents/container to Disposal of contents/container in accordance with local/regional/national/international regulations..

Additional advice on labelling

Labeling according to the revised Hazard Communication Standard (HCS 2012) according to 29 CFR 1910.1200(f)

Hazards not otherwise classified

Adverse physicochemical effects:
See section 9 for physical and chemical properties.
The vapors are heavier than air and can accumulate in high concentrations on the ground, in cavities, channels and cellars.
The accumulation in lowlying or closed rooms can cause increased danger of fire and explosion.
Vapors can travel considerable distances to a source of ignition where they can ignite, flash back, or explode.
Vapors of flammable solvents can accumulate in the gas phase of closed container, especially during heat treatment.
Therefore keep away from fire and sources of ignition.
This material can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe).
This material can accumulate static charge by flow or agitation and can be ignited by static discharge.
The product will be applied by spraying.
In use, may form flammable/explosive vapor-air mixture.
Until complete evaporation of flammable components explosive vapor-air mixtures may form, even after use.

Adverse human health effects and symptoms:
See section 11 for toxicological information.
Inhalation of aerosol mists can cause damage to health.

Adverse environmental effects:
See section 12 for environmental information.

Other adverse effects:
Special danger of slipping by leaking/spilling product.

Results of PBT-/vPvB-assesment:
See under section 12.5 - Results of PBT and vPvB assessment.

3. Composition/information on ingredients

Mixtures

Chemical characterization

Solution of silicones in a mixture of solvents

Hazardous components

CAS No	Components	Quantity
64742-49-0	hydrocarbons, C7, n-alkanes, isoalkanes, cyclics	84 %

4. First-aid measures

Description of first aid measures

General information

Remove affected person from the danger area and lay down.
Take off immediately all contaminated clothing and wash it before reuse.
Put victim at rest, cover with a blanket and keep warm.
Do not leave affected person unattended.
If a person vomits when lying on his back, place him in the recovery position.
If breathing is irregular or stopped, administer artificial respiration.
If unconscious but breathing normally, place in recovery position and seek medical advice.
Never give anything by mouth to an unconscious person or a person with cramps.
In the event of cardiac arrest immediately perform cardiopulmonary resuscitation.
In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

Self-protection of the first aider:
Wear personal protection equipment (refer to section 8).
First Aid.

Notes for the doctor:
Aspiration hazard
Risk of product entering the lungs on vomiting after ingestion.
Aspiration may cause pulmonary oedema and pneumonitis.
Symptoms may develop several hours following exposure; medical observation therefore necessary for at least 48 hours.

After inhalation

Remove victim out of the danger area.
Provide fresh air.
In the case of lung irritation: Primary treatment using corticoide spray, eg. Auxiloson spray, Pulmicort-dosage-spray. (Auxiloson and Pulmicort are registered trademarks.) Call a physician immediately.
Consult a doctor immediately in the case of inhaling spray mist and show him packing or label.

After contact with skin

Wash immediately with:
Water and soap
Rub greasy ointment into the skin.
Do not wash with:
Solvents/Thinner
In case of skin irritation, consult a physician.

After contact with eyes

In case of contact with eyes flush immediately with plenty of flowing water for 10 to 15 minutes holding eyelids apart and consult an ophthalmologist.
Remove contact lenses, if present and easy to do. Continue rinsing.
If present: Initial treatment with Previn. (Previn is a registered trademark).
Protect uninjured eye.

After ingestion

Do NOT induce vomiting.
Give nothing to eat or drink.
Observe risk of aspiration if vomiting occurs.
Never give anything by mouth to an unconscious person or a person with cramps.
Call a physician immediately.

Most important symptoms and effects, both acute and delayed

The following symptoms may occur:
Cough
Dyspnoea
Cyanosis (blue coloration of the blood)

Pulmonary oedema
Pneumonia
Acidosis
Depression of central nervous system
Headache
Nausea
Dizziness
Dizziness
Inebriation
Unconsciousness

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.
In case of ingestion, the stomach should be emptied by gastric lavage under qualified medical supervision.
Regulation of the blood circulation, possible shock treatment.
Where appropriate artificial ventilation.
Subsequent observance for pneumonia and lung oedema.

5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media

Water mist
Extinguishing powder (ABC-powder)
Foam
Carbon dioxide (CO_2)

Fire class (DIN EN 2): B (Fires of liquids or liquid turning substances).

Unsuitable extinguishing media

Full water jet
Water spray jet

Specific hazards arising from the chemical

In principle, fire gasses of organic materials have to be classified as toxic to the respiratory system.
Burning produces heavy smoke.

Hazardous combustion products:
Carbon monoxide
carbon dioxide (CO_2)
Hydrocarbons
Pyrolysis products, toxic

Special protective equipment and precautions for fire-fighters

Usual measures of preventive and averting fire protection.
Co-ordinate fire-fighting measures to the fire surroundings.
Do not inhale explosion and combustion gases.
Move to fresh air in case of accidental inhalation of fumes from overheating or combustion.
Beware of reignition.
Use caution when applying carbon dioxide in confined spaces. Carbon dioxide can displace oxygen.
Move undamaged containers from immediate hazard area if it can be done safely.
Stop and contain spill/release if it can be done safely. If this cannot be done, allow fire to burn under control.
Use water spray/stream to protect personnel and to cool endangered containers.
Collect contaminated fire extinguishing water separately. Do not allow entering drains or surface water.
Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

Protective equipment and precautions for firefighters
Wear a self-contained breathing apparatus and chemical protective clothing.
DIN-/EN-Norms EN 469
Firefighting protective clothing.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

General advice

Avoid contact with skin, eyes and clothes.
Do not breathe vapor or spray.
Remove all sources of ignition.
Prevent further leakage or spillage if safe to do so.

Remove persons to safety.
Be aware that gases can spread at ground level (heavier than air) and pay attention to the wind direction.
Provide adequate ventilation.
Special danger of slipping by leaking/spilling product.

For non-emergency personnel:
Use personal protection equipment.
Walk out of the danger zone and notify trained personnel.
Emergency procedures:
Keep the factory emergency plan and the information chain.

For emergency responders:
Use personal protection equipment.
The personal protective equipment must be adapted to the situation.
Suitable material:
See under section 8.2 - Personal protection equipment (PPE).

Environmental precautions

Do not allow to enter into surface water or drains.
Do not allow to enter into soil/subsoil.
Ensure waste is collected and contained.
Supress gases/vapors/mists with water spray jet.
In case of gas escape or of entry into waterways, soil or drains, inform the responsible authorities.

Methods and material for containment and cleaning up

Other information

For containment:
Repair leaks if without risk.
Move containers from spill area.
Make sure spills can be contained, e.g. in sump pallets or kerbed areas.
Prevent spread over a wide area (e.g. by containment or oil barriers).
Remove from the water surface (e.g. skimming, sucking).
Cover drains.

For cleaning up:
Clean-up methods - large spillage:
Absorb with liquid-binding material (sand, diatomaceous earth, acid- or universal binding agents).
Shovel into suitable container for disposal.
Local authorities should be advised if significant spillages cannot be contained.
Clean-up methods - small spillage:
Clear spills immediately.
Wipe up with absorbent material (eg. cloth, fleece).
Collect in closed and suitable containers for disposal.
Clear contaminated areas thoroughly.
Recommended cleansing agent:
Clean with detergents. Avoid solvent cleaners.
Retain contaminated washing water and dispose it.
Ensure all waste water is collected and treated via a waste water treatment plant.
Ventilate affected area.

Suitable material for taking up:
Sand
Kieselguhr
Universal binder
Absorbing material, organic

Unsuitable material for taking up:
None known

Reference to other sections

Personal protection equipment (PPE): see section 8
Disposal: see section 13

7. Handling and storage

Precautions for safe handling

Advice on safe handling

Measures to prevent aerosol and dust generation:
All work processes must always be designed so that the following is as low as possible:
Inhalation of vapors or spray/mists
Eye contact
Skin contact

Technical ventilation of workplace
Vapors are heavier than air.
Provide room air exhaust at ground level.
During filling, metering and sampling should be used if possible:
Splashproof grounded devices
Devices with local exhaust
Use only in a exhaust booth with integrated air filter.
Use in ventilated spray booths only.
Recirculation of exhaust air is not recommended.
Always close containers tightly after the removal of product.

Advice on protection against fire and explosion

Measures to prevent fire:
The product is: Highly flammable.
The formation of combustible vapors is possible, at temperatures above: -27 °C (Flash point - 15 °C)
Vapors may form explosive mixtures with air.
Spray mist may be flammable at temperatures below the flash point.
Reignition possible over considerable distance.
Vapors are heavier than air, spread along floors and form explosive mixtures with air.
Due to danger of explosion, prevent leakage of vapors into cellars, flues and ditches.
Provide earthing of containers, equipment, pumps and ventilation facilities.
Use explosion-proof machinery, apparatus, ventilation facilities, tools etc.
Use only non-sparking tools.
Take precautionary measures against static discharges.
Flammable vapors can accumulate in steam space of closed systems.
Only use the material in places where open light, fire and other flammable sources can be kept away.
Keep away from sources of heat (e.g. hot surfaces), sparks and open flames.
Usual measures for fire prevention.
Fire-fighting equipment on the basis of class B.
Never use pressure to empty container.
Wear anti-static footwear and clothing

Measures according to German "Explosion rules" required:
Prevention measures regarding formation of explosible atmosphere (restriction and supervision of concentration, inertisation, airtightness, ventilation, warning device, etc.).
Prevention measures regarding ignition of explosible atmosphere (zone graduation, removing of ignition sources, explosion-proof electrical installation, earthing, etc.).
Constructive measures for restriction of effects regarding explosions (resistance to pressure of explosions, discharge of pressure of explosions, suppression of explosions, etc.).

Further information on handling

Environmental precautions:
Shafts and sewers must be protected from entry of the product.
Transfer wash-downs in sealed containers.
Provide for retaining containers, e.g. floor pan without outflow.
For restriction of emission on volatile organic compounds (VOC) the solvent vapours should be supplied to exhaust air purification facilities (filter, gas washer, incineration).

Advices on general occupational hygiene:
Wear personal protection equipment (refer to section 8).
Minimum standard for preventive measures while handling with working materials are specified in the TRGS 500.
General industrial hygiene practice.
Handle in accordance with good industrial hygiene and safety practice.
Working places should be designed to allow cleaning at any time.
Floors, walls and other surfaces in the hazard area must be cleaned regularly.
Clean spray booth and exhaust hood completely with every product change.
When using do not eat, drink, smoke, sniff.
Thorough skin-cleansing after handling the product.
Used working clothes should not be worn outside the work area.

Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels

Suitable floor material:
Floors should be impervious, resistant to liquids and easy to clean.

Protect against:
Heat
Cold

Recommended storage temperature: +10 ... +30 °C

Keep away from:
Food and feedingstuffs

Packaging materials:
Suitable container/equipment material:
Keep/Store only in original container.
Unsuitable container/equipment material:
See under section 8.2 - Hand protection.

Hints on joint storage

Do not store together with:
Storage class:
1 (Explosive hazardous substances)
2 A (Gases (except aerosol dispensers and lighters))
4.1 A (Other potentially explosive hazardous substances)
4.1 B (flammable solids)
4.2 (Pyrophoric or self-heating substances)
4.3 (Hazardous substances that release flammable gases when in contact with water)
5.1 A (Highly oxidising substances)
5.1 C (Ammonium nitrate and preparations containing ammonium nitrate)
5.2 (Organic peroxides and self-reactive substances)
6.1 B (Non-combustible substances of acute toxicity, category 1 and 2 / very toxic substances)
6.2 (Infectious substances)
7 (Radioactive substances)

Further information on storage conditions

Technical measures and storage conditions:
The valid water and zoning ordinances must be observed.
Heating causes rise in pressure with risk of bursting.
Keep away from sources of ignition - No smoking.
Keep in a cool, well-ventilated place.
Keep container tightly closed.
Protect containers against damage.
Ensure adequate ventilation of the storage area.
Store small packages in a suitable, robust cabinet.
Do not store outside.
See also instuctions on the label.

8. Exposure controls/personal protection

Control parameters

Exposure limits

CAS No.	Substance	ppm	mg/m³	f/cc	Category	Origin
142-82-5	Heptane (n-Heptane)	500	2000		TWA (8 h)	PEL
-	Heptane, all isomers	400			TWA (8 h)	ACGIH-2021
		500			STEL (15 min)	ACGIH-2021
142-82-5	n-Heptane	85	350		TWA (8 h)	REL
		C 440	C 1800		Ceiling	REL
110-54-3	n-Hexane	500	1800		TWA (8 h)	PEL
		50	180		TWA (8 h)	REL
		50			TWA (8 h)	ACGIH-2021

Biological Exposure Indices (BEI-ACGIH)

CAS No.	Substance	Determinant	Value	Test material	Sampling time
110-54-3	n-HEXANE	2,5-Hexanedion (without hydrolysis)	0.5 mg/L	urine	End of shift

Additional advice on limit values

Country information (EU)
(http://www.dguv.de/ifa/fachinfos/occupational-exposure-limit-values/foreign-and-eu-limit-values/index.jsp)
Country information (USA) (https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9992&p_text_version=FALSE)
National Institute for Occupational Safety and Health - NIOSH (http://cdc.gov/niosh/pel88/pelstart.html) / Occupational Safety and Health Administration - Department of Labour (http://osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=SATNDARSp_toc_level=0)
Source of law:

Recommended monitoring procedures:
Workplace atmospheres - Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents (BS EN 14042):
Personal air monitoring
Room air monitoring
Test tube
Gas warning system
Biological monitoring

Preliminary concentration measurements:
Suitable detector tubes for measuring the current concentration in the air at the workplace: DRÄGER test tubes - short-term tubes (http://www.gasmesstechnik.de)
DRÄGER test tubes - Short-term tubes - Petroleum hydrocarbons 10/a (n-octane, measuring range: 10 - 300 ppm, response time: 60 sec) (http://www.gasmesstechnik.de)
DRÄGER test tubes - Short-term tubes - Petroleum hydrocarbons 100/a (n-octane, measuring range: 100 - 2500 ppm, response time: 30 sec) (http://www.gasmesstechnik.de)

Preventive industrial medical examinations are to be offered.
See under section 15.1 - National regulations.

Exposure limits at intended use:

DNEL-/PNEC-values:

Risk management measures according to used control banding approach:
Control banding for chemicals according to the ILO CHEMICAL CONTROL TOOLKIT (ICCT): ICCT-Guidelines and Control Guidance Sheets (http://www.ilo.org/legacy/english/protection/safework/ctrl_banding/toolkit/main_guide.pdf)

Used model:
Consider appropriate model solutions according to good engineering practices while designing the work process if available.

Exposure controls

Appropriate engineering controls

Substance/mixture related measures to prevent exposure during identified uses:
Technical measures to prevent exposure:
Design of appropriate work processes and engineering controls and the use of adequate materials (closed systems with gas-displacement, physical cut-off of man and machine, model solutions as certified working methods, working appliance according to the state of the art, optimisation of process / spray robots, working appliance for prevention of skin contact, models of working times).

Organisational measures to prevent exposure:
Execution of collective protection measures at source and appropriate organisational measures (local exhaust ventilation, ventilation by technical means, general ventilation, measures on averting a danger at breakdowns / at emergencies / after accidents, first aid measures, manner related measures: operating instruction / instruction of employees, occupational medicine health precaution).

Structural measures to prevent exposure:
Execution of individual and personnel protection measures (personal protective equipment - PPE).

If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn. Technical measures and the application of suitable work processes have priority over personal protection equipment.

References for design of technical equipment:
See under section 7.1 - Precautions for safe handling.

Summary of the risk management measures for exposure scenario:
Use only the following product amount per time unit:
No information available.
Minimum room-width and room-height for handling/application:
No information available.
Minimum room ventilation rate for handling/application (air changes per hour):
No information available.

Individual protection measures, such as personal protective equipment

Eye/face protection

If required according to hazard assessment:
Suitable eye protection:
Eye glasses with side protection (EN 166)
Recommended eye protection articles:
UVEX I-VO / UVEX I-3 / UVEX SUPER OTG
Or comparable articles from other companies.

Hand protection

Skin protection:
Preventive skin protection.:
Draw up skin protection programme.
Before starting work, apply solvent-resistant skincare preparations.
e.g. sansibal® / sansibon®, dualin® (PETER GREVEN PHYSIODERM)
Wash hands before breaks and after work.
e.g. ecosan®, topscrub® soft / topscrub® extra / topscrub® nature (PETER GREVEN PHYSIODERM)
After cleaning apply high-fat content skin care cream.
e.g. physioderm® creme, cura soft® / cUrea soft (PETER GREVEN PHYSIODERM)
Apply skin care products after work.

If required according to hazard assessment:
When handling with chemical substances, protective gloves should be worn.
The quality of the protective gloves resistant to chemicals must be chosen as a function of the specific working place concentration and quantity of hazardous substances.
Decrease wearing protection gloves to an inevitable degree to avoid skin rash.
Technical and organizational protective actions have to be preferred.
Breakthrough times and swelling properties of the material must be taken into consideration.
Check leak tightness/impermeability prior to use.
Wear cotton undermitten if possible.
Change preventive gloves once by hour or use special skin-protective preparations for protective gloves carrier,
e.g. physioderm® proGlove (PETER GREVEN PHYSIODERM)
Take recovery periods for skin regeneration.
Do not wear gloves near rotary machines and tools.
Dispose preventive gloves after defect or expiry of wearing time. Replace when worn.
In the case of wanting to use the gloves again, clean them before taking off and air them well.

Wearing time with permanent contact:
Suitable gloves type
Gloves with long cuffs
Recommended glove articles:
Suitable materials at long term, direct contact (Recommended: Preventive index 6, accordingly > 480 min. permeation

time):
Nitrile rubber / NBR (KCL-CAMATRIL VELOURS® - Art. No. 730) - Layer thickness: 0,4 mm
Fluorine rubber / FKM / Viton (KCL-VITOJECT® - Art. No. 890) - Layer thickness: 0,7 mm
Or comparable articles from other companies.

Unsuitable material:
Butyl caoutchouc (butyl rubber)
NR (natural rubber, natural latex)

Wearing time with occasional contact (splashes):
Suitable gloves type
Disposable gloves
Recommended glove articles:
Suitable materials at short term contact or splash (Recommended: Preventive index 3, accordingly > 60 min. permeation time):
Disposable gloves of special nitrile rubber / NBR (KCL-DERMATRIL® P - Art. No. 743) - Layer thickness: 0,2 mm
Or comparable articles from other companies.

The statements are based on self-tests, literary reference and information of glove manufacturers or have been derived from similar substances by analogy.
Source: CHEMIKALIEN-MANAGER - KCL-software for hand protection.
It has to be noticed, that daily time of use of chemical protective gloves may be quite shorter in practice because of many factors of influence (e.g. thermal and mechanical stress as well as special conditions on the floor) than the permeation time determined in accordance to EN 374.
The respective permeation time doubles/halvens at about 1,5 times larger/lower layer thickness.
Declared permeation times are not carried out under practical conditions. Therefore a maximum wearing time up to 50 % of breakthrough time is recommended.
They relate to the pure solvent as mean component.

Barrier creams are not substitutes for body protection.

Skin protection

Suitable protective clothing:
Overall, Natural fibres (e.g. cotton) (EN 340)
For the protection against direct skin contact, body protective clothing is essential (in addition to the usual working clothes).
When handling with chemical substances, protective clothing should be worn.
DIN-/EN-Norms DIN EN 468
Chemical protection clothing (Disposable suit antistatic)
type 6 limited splash-tight
type 5 particle-tight (method B)
type 4 spray-tight
Recommended protective clothing articles:
TYVEK CLASSIC PLUS (DU PONT)
Or comparable articles from other companies.

Chemical resistant safety shoes with conductible sole (EN ISO 20345)

Wash contaminated clothing prior to re-use.
Used working clothes should not be worn outside the work area.
Street clothing should be stored separately from work clothing.

Thermal hazards:
No thermal hazards during use of this product.

Respiratory protection

If required according to hazard assessment:
Respiratory protection necessary at:
aerosol or mist formation + exceeding exposure limit values +
high concentrations / prolonged exposure / insufficient ventilation / insufficient exhaust
Use only respiratory protection equipment with CE-symbol including four digit test number.
Filter types: A, B, E, K. Class 1: Maximum permitted contaminant concentration in inhaled air = 1000 mL/m3 (0.1 % by vol.); class 2: maximum permitted contaminant concentration in inhaled air = 5000 mL/m³ (0.5 % by vol.); class 3: maximum permitted contaminant concentration in inhaled air = 10000 mL/m³ (1.0 % by vol.)
The filter class must be suitable for the maximum contaminant concentration (gas/vapor/aerosol/particulates) that may

arise when handling the product. If the concentration is exceeded, self-contained breathing apparatus must be used. Observe the wear time limits according GefStoffV in combination with the rules for using respiratory protection apparatus (BGR 190).
The use of filter equipment requires a minimum oxygen content of 17 Vol-% in the surrounding atmosphere and that the maximum permitted gas concentration - normally 0,5 Vol-% - is not exceeded.

Suitable respiratory protection apparatus:
Half-face mask or quarter facepiece: maximum use concentration for substances with exposure limits: P1 filter: up to a max. of 4 times the exposure limit. P2 filter: up to a max. of 10 times the exposure limit. P3 filter: up to a max. of 30 times the expo.

Recommended respiratory protection articles:
Half mask or quarter mask with combination filter A1P1/A2P2 for gases, vapors and particles. (EN 140, EN 14387)
Filtering half mask or quarter mask with combination filter FFA1 P1/FFA2P2 for gases, vapors and particles. (EN 405)
Gas filtrating Half-face mask FFA (EN 405)
Model 4251 (FFA1P1 - 1000 ml/m3) / 4255 (FFA2P2SL - 5000 ml/m3) (3M)
Half-face mask or Quarter-face mask with gas filter (EN 140, EN 14387)
Filter type 6051 (A1 - 1000 ml/m3) / 6055 (A2 - 5000 ml/m3) (3M)
Full-face mask with gas filter (EN 136, EN 14387)
Gas filter type: A, Indication colour: brown
Or comparable articles from other companies.

Environmental exposure controls

Environmental exposure controls:
Technical measures to prevent exposure:
Discharge exhaust air only with suitable seperators to atmosphere.
Organisational measures to prevent exposure:
Should not be released into the environment.
Structural measures to prevent exposure:

Use the following recovery and/or abatement technique for cleaning waste gases:
Exhaust air scrubber
Adsorption
Incineration

Further information see under section 6.2 - Environmental precautions.

9. Physical and chemical properties

Information on basic physical and chemical properties

Physical state:	liquid
Color:	colorless
Odor:	characteristic

		Test method
Changes in the physical state		
Melting point/freezing point:	not determined	
Boiling point or initial boiling point and boiling range:	> 90 °C	literature value
Sublimation point:	not applicable	
Softening point:	not applicable	
Pour point:	not applicable	
Flash point:	-12 °C	EN ISO 13736
Flammability		
Solid/liquid:	not applicable (Liquid)	
Gas:	not applicable (Liquid)	

Explosive properties

In use, may form flammable/explosive vapor-air mixture.
The statements for steam pressure, ignition point and explosion levels apply to the solvent / solvent mixture.

Lower explosion limits:	0,6 vol. %	literature value
Upper explosion limits:	8,0 vol. %	literature value
Auto-ignition temperature:	> 200 °C	literature value

Self-ignition temperature

Solid:	Not pyrophoric.	
Gas:	Not pyrophoric.	
Decomposition temperature:	not determined	

Oxidizing properties

not relevant

pH-Value:	not applicable	
Viscosity / dynamic:	not determined	
Viscosity / kinematic: (at 40 °C)	2,0 mm²/s	DIN 53015
Flow time: (at 23 °C)	25 s	3 DIN EN ISO 2431
Water solubility: (at 20 °C)	practically insoluble: < 0,1 g/L	literature value

Solubility in other solvents

miscible with most organic solvents

Partition coefficient n-octanol/water:	not applicable (Mixtures)	
Vapor pressure: (at 20 °C)	< 70 hPa	literature value
Vapor pressure: (at 50 °C)	< 235 hPa	literature value
Density (at 20 °C):	(6,175 lbs/gal) 0,74 g/cm³	DIN 51757
Bulk density:	not applicable (Liquid)	
Relative vapour density: (at 25 °C)	~ 3.2 (Air=1)	literature value

Other information

Other safety characteristics

Solvent separation test:	not applicable	
Solvent content:	not determined	
Solid content:	not determined	
Evaporation rate: (at 20 °C)	< 3.9 (n-Butyl acetate=1)	ASTM D 3539

Further Information

Temperature Class (DIN EN 60079-0): T 3 (T > +200 °C ... <= +300 °C)
Limiting oxygen concentration (LOC) (DIN EN 14756): No data available
Explosion group: IIA
Maximum experimental safe gap (MESG) (IEC 60079-1-1): > 0,9 mm
Minimum ignition current (MIC) (IEC 60079-11): No data available
Minimum ignition energy (MIE) (DIN EN 13673-1): No data available
Odor threshold: 900 ppm ((heptane; n-heptane), literature value)
Molecular weight: ~ 100 g/mol (calculated)

Data apply to the main component.

Conductivity (ASTM D 2624): > 1000 pS/m
Surface tension: No data available
Fat solubility: No data available
Calculated oxidation potential of the mixture (OP): not relevant

Substance group relevant properties:
Data relevant with regard to physical hazard classes (supplemental):
Explosives
not applicable
Flammable gases
Non-flammable. / not applicable (Liquid)
Aerosols
Non-flammable. / not applicable (Liquid)
Oxidising gas
Not oxidising. / not applicable (Liquid)
Gases under pressure
not applicable (Liquid)

Flammable liquids
Highly flammable
In use, may form flammable/explosive vapor-air mixture.
flammable solids
Non-flammable. / not applicable (Liquid)
Self-reactive substances and mixtures
not applicable
Pyrophoric liquids
Not pyrophoric.
Pyrophoric solids
Not pyrophoric. / not applicable (Liquid)
self-heating substances and mixtures
not applicable
Substances or mixtures which, in contact with water, emit flammable gases
not applicable
Oxidising liquids
Not oxidising.
Oxidising solids
Not oxidising. / not applicable (Liquid)
Organic peroxides
not applicable
Corrosive to metals.
Not corrosive to metals.

10. Stability and reactivity

Reactivity

The product is chemically stable under recommended conditions of storage, use and temperature.

Chemical stability

Stability: Stable

The product is chemically stable under recommended conditions of storage, use and temperature.

Possibility of hazardous reactions

Hazardous reactions: Will not occur

No hazardous reaction when handled and stored according to provisions.

Conditions to avoid

Heat, flames and sparks.
Further information see under section 7.2 - Conditions for safe storage, including any incompatibilities.
Further information see under section 10.5 - Incompatible materials.

Incompatible materials

Violent reaction with:
strong
Further information see under section 7.1 - Precautions for safe handling.

Hazardous decomposition products

Does not decompose when used for intended uses.
No known hazardous decomposition products.
Under fire conditions: See under section 5.2 - Specific hazards arising from the chemical.

11. Toxicological information

Information on toxicological effects

Route(s) of Entry

Inhalation: X
Skin: X
Ingestion: X

Toxicocinetics, metabolism and distribution

There are no data available on the preparation/mixture itself.
The product has not been tested.

Information on likely routes of exposure /
Symptoms related to the physical, chemical and toxicological characteristics:
See under section 4.2 - Most important symptoms/effects, acute and delayed.

Exposure route:
In case of ingestion:
Ingestion causes nausea, weakness and central nervous system effects.

Aspiration hazard
The risk of aspiration (penetration of liquids through the oral or nasal cavity into the trachea and lower respiratory system) is restricted solely to accidental ingestion (accident involvement) and not to the inhalation of fine mist (aerosols), as this does not result in juxtaposition of the particles, which could trigger a chemical pneumonia in the lungs.
According to the "qualitative exposure assessment" for as Asp. Tox 1, H304 classified substances and mixtures (without DNEL's) the risk management measures restricting the use of the safety P301+P310 and P331 in the SDS and on the label.

In case of skin contact:
irritant.
erythema (redness)
Prolonged or repeated skin contact may cause removal of natural fat from the skin resulting in dermatitis (skin inflammation).

In case of inhalation:
slightly irritant but not relevant for classification.
Narcotic effects
In animal experiments aerosol mists (from organic solutions / dispersions or aquatic emulsions) based on polymeric components of the mixture can cause damage to health if inhaled.

In case of eye contact:
slightly irritant but not relevant for classification.
Conjunctival redness.

Delayed and immediate effects as well as chronic effects from short and long-term exposure:
Inhalative specific target organ toxicity (single exposure)

Interactive effects:
Not relevant

Absence of specific data:
No data is available on the product itself. Description of possible hazardous to health effects is based on experience and/or toxicological characteristics of several components.
However, some datas are not complete regarding particular main components. Nevertheless according to the experience of the manufacturer there are no other hazards expected then those which are already mentioned on the label.

Mixture versus substance information:
Not relevant

Acute toxicity

Based on available data, the classification criteria are not met.

CAS No	Components				
	Exposure route	Dose	Species	Source	Method
64742-49-0	hydrocarbons, C7, n-alkanes, isoalkanes, cyclics				
	oral	LD50 > 5840 mg/kg	Rat	Supplier / ECHA	
	dermal	LD50 > 2800 mg/kg	Rat	Supplier / ECHA	
	inhalation (4 h) vapour	LC50 > 23,3 mg/l	Rat	Supplier / ECHA	OECD 403

Irritation and corrosivity

Causes skin irritation
Serious eye damage/eye irritation: Based on available data, the classification criteria are not met.

Sensitizing effects

Based on available data, the classification criteria are not met.

Carcinogenic/mutagenic/toxic effects for reproduction

Based on available data, the classification criteria are not met.

Specific target organ toxicity (STOT) - single exposure

May cause drowsiness or dizziness (hydrocarbons, C7, n-alkanes, isoalkanes, cyclics)

Specific target organ toxicity (STOT) - repeated exposure

Based on available data, the classification criteria are not met.

Aspiration hazard

May be fatal if swallowed and enters airways

12. Ecological information

Ecotoxicity

Aquatic toxicity:
Acute (short-term) fish toxicity:
There are no data available on the preparation/mixture itself. The product has not been tested.
Acute (short-term) toxicity to crustacea:
There are no data available on the preparation/mixture itself. The product has not been tested.
Acute (short-term) toxicity to algae and cyanobacteria:
There are no data available on the preparation/mixture itself. The product has not been tested.

Chronic (long-term) toxicity to aquatic invertebrate:
There are no data available on the preparation/mixture itself. The product has not been tested.
Chronic (long-term) fish toxicity:
There are no data available on the preparation/mixture itself. The product has not been tested.

Toxicity to other aquatic plants/organisms:
No data available (Substances/Ingredient)

Terrestrial toxicity:
Acute and subchronic bird toxicity:
No data available (Substances/Ingredient)
Bird reproduction toxicity:
No data available (Substances/Ingredient)
Acute earthworm toxicity:
No data available (Substances/Ingredient)
Chronical earthworm toxicity (reproduction):
No data available (Substances/Ingredient)
Useful insect toxicity:
No data available (Substances/Ingredient)
Acute plant toxicity:
No data available (Substances/Ingredient)
Chronic plant toxicity:
No data available (Substances/Ingredient)
Toxicity to soil macroorganisms except of arthropods:
No data available (Substances/Ingredient)
Effects on soil microorganisms:
No data available (Substances/Ingredient)

Behaviour in waste water treatment plants:
Due to its low solubility in water the product is almost completely mechanically separated in biological sewage plants.
Observe local regulations concerning effluent treatment.

CAS No	Components						
	Aquatic toxicity	Dose		[h] | [d]	Species	Source	Method
64742-49-0	hydrocarbons, C7, n-alkanes, isoalkanes, cyclics						
	Acute fish toxicity	LL50 mg/l	> 13,4	96 h	Oncorhynchus mykiss	Supplier / ECHA	OECD 203
	Acute algae toxicity	ErC50 mg/l	10-30	72 h	Pseudokirchneriella subcapitata	Supplier / ECHA	OECD 201
	Acute crustacea toxicity	EL50	3 mg/l	48 h	Daphnia magna	Supplier / ECHA	OECD 202
	Fish toxicity	NOEC mg/l	1,534	28 d	Oncorhynchus mykiss	Supplier / ECHA	[growth rate]
	Algae toxicity	NOEC	6,3 mg/l	4 d	Pseudokirchneriella subcapitata	Supplier / ECHA	OECD 201
	Crustacea toxicity	NOEC	0,17 mg/l	21 d	Daphnia magna	Supplier / ECHA	OECD 211
	Acute bacteria toxicity	(26,81 mg/l)		0 h	Tetrahymena pyriformis	ECHA	[48h] [growth]

Persistence and degradability

Abiotic degradation:
Physicochemical elimination:
Oxidation:
not applicable (Mixtures)

In air a rapid reduction is expected.
The information about ecology refers to the main components.

Hydrolysis:
not applicable (Mixtures)
It is not expected to conversion due to hydrolysis to any significant extent.
The information about ecology refers to the main components.

Photochemical elimination:
Photolysis:
not applicable (Mixtures)
It is not expected to conversion due to photolysis to any significant extent.
The information about ecology refers to the main components.

Ozonolysis:
not applicable (Mixtures)

Biodegradation:
not applicable (Mixtures)

Bioaccumulative potential

not applicable (Mixtures)

Mobility in soil

Surface tension:
See under section 9.1 - Information on basic physical and chemical properties.

Distribution:
Water-air (volatility rate, Henry-constant):
not applicable (Mixtures)
The product is insoluble and floats on water.
Product is easily volatile.
The information about ecology refers to the main components.

Soil-Water (Adsorption coefficient):
not applicable (Mixtures)
If product enters soil, it will be mobile and may contaminate groundwater.
The information about ecology refers to the main components.

Soil-Air (volatility rate):
not applicable (Mixtures)
Product is easily volatile.
The information about ecology refers to the main components.

This product contains one or more hydrocarbon UVCB's. Standard tests for this endpoint are intended for single substances and are not appropriate for this complex substance.

Other adverse effects

Ozone depletion potential (ODP):
No data available (Substances/Ingredient)

Photochemical ozone creation potential (POCP):
No data available (Substances/Ingredient)

Global warming potential (GWP):
No data available (Substances/Ingredient)

Endocrine disrupting potential
No data available

AOX: Product does not contain any organic halogens.

13. Disposal considerations

Waste treatment methods

Disposal recommendations

Waste treatment options:
Send to a hazardous waste incinerator facility under observation of official regulations.

Dispose of waste according to applicable legislation.
Waste disposal according to directive 2008/98/EC, covering waste and dangerous waste.
Properties of waste which render it hazardous:
Highly flammable
Irritant — skin irritation and eye damage
Specific Target Organ Toxicity (STOT)/Aspiration Toxicity

Evidence for disposal must be provided.
Consult the appropriate local waste disposal expert about waste disposal.
Waste for recycling is to be classified and labelled.
For recycling, contact recycling exchanges.
May not be disposed or deposited together with domestic garbage.
Do not mix with other wastes.
Do not flush into surface water or sanitary sewer system.
Do not dispose of waste into sewer.
Before discharge in public drains (e.g. residues of washing- and rinsing liquids) please observe the relevant regulations. In case of further questions please contact your waste- or environmental representative or the responsible authority.
Clean IBCs or drums at approved facility only.
The waste producer is resposible for correct coding and designation of his wastes.
The allocation of waste identity numbers/waste descriptions must be carried out according to the EEC, specific to the industry and process.
List of proposed waste codes/waste designations in accordance with EWC:

RCRA Hazardous wastes (Resource Conservation and Recovery Act)

D001 Ignitability

Contaminated packaging

Other disposal recommendations:
Contaminated packages must be completely emptied and can be re-used following proper cleaning.
Cleaning by recycling company.
Recommended cleansing agent:
Clean with detergents. Avoid solvent cleaners.

Handle contaminated packages in the same way as the substance itself.
Non-contaminated packages may be recycled.
Packing which cannot be properly cleaned must be disposed of.
As well uncleaned (empty) containers remain contaminated by product residues and may be hazardous by vapours. They have to be disposed by specialists or have to be supplied to a licensed reconditioning.
The conditions of the regional reconditioning companies have to be observed.

14. Transport information

US DOT 49 CFR 172.101

UN number or ID number:	UN1268
Proper shipping name:	PETROLEUM PRODUCTS, N.O.S.
Transport hazard class(es):	3
Packing group:	II
Hazard label:	3

Marine transport (IMDG)

UN number or ID number:	UN1268
UN proper shipping name:	PETROLEUM PRODUCTS, N.O.S. (Naphtha (Petroleum), hydrotreated, light)
Transport hazard class(es):	3
Packing group:	II
Hazard label:	3

Marine pollutant:	P
Special Provisions:	-
Limited quantity:	1 L
Excepted quantity:	E2
EmS:	F-E, S-E
Segregation group:	IMDG-Code segregation group not applicable

Other applicable information (marine transport)

Exception(s): Not applicable

Air transport (ICAO-TI/IATA-DGR)

UN number or ID number:	UN1268
UN proper shipping name:	PETROLEUM PRODUCTS, N.O.S.
Transport hazard class(es):	3
Packing group:	II
Hazard label:	3

Special Provisions:	A3
Limited quantity Passenger:	1 L
Passenger LQ:	Y341
Excepted quantity:	E2
IATA-packing instructions - Passenger:	353
IATA-max. quantity - Passenger:	5 L
IATA-packing instructions - Cargo:	364
IATA-max. quantity - Cargo:	60 L

Other applicable information (air transport)

ERG Kodex: 3H

The state variations in chapter 2.8.1 and the operator variations in chapter 2.8.3 for shipping of dangerous goods in limited quantities according to chapter 2.7 of the valid ICAO/IATA Dangerous Goods Regulations have to be observed.

The rulings for dangerous goods by air mail according to chapter 2.4 of the valid ICAO/IATA Dangerous Goods Regulations and the conventions of the Universal Postal Union (UPU) as well as the clauses of the relevant National Postal Administation have to be observed. Airmail: prohibited.

Environmental hazards

ENVIRONMENTALLY HAZARDOUS: Yes

Danger releasing substance: Naphtha (Petroleum), hydrotreated, light

Special precautions for user

Further information see under section 6, 7, 8.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

No bulk transport in accordance with IBC code.
It is sold exclusively in traffic legally authorized and appropriate packaging.

Other applicable information

Postal, express and courier services:
Postal service (national):
Refer to your National Postal Administation.
Express freight / special delivery:
Refer to your National Postal Administation.
Courier service (national):
The general conditions of business of the particular courier service have to be observed.

15. Regulatory information

U.S. Regulations

National Inventory TSCA

All intentional used ingrendients of this product are listed in the TSCA-inventory or correspond to TSCA-exceptions on polymers according to 40 CFR 723.

National regulatory information

SARA Section 304 CERCLA:
n-Hexane (110-54-3): Reportable quantity = 5,000 (2270) lbs. (kg)
SARA Section 311/312 Hazards:
hydrocarbons, C7, n-alkanes, isoalkanes, cyclics (64742-49-0): Fire hazard, Immediate (acute) health hazard
SARA Section 313 Toxic release inventory:
n-Hexane (110-54-3): De minimis limit = 1.0 %, Reportable threshold = Standard
Clean Air Act Section 112(b):

n-Hexane (110-54-3)

State Regulations

Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65, State of California)

This product can not expose you to chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Additional information

Other regulations, restrictions and prohibition regulations:

International chemical inventories (Registration status on substances): No data available

Other regulations, restrictions and prohibition regulations:

International chemical inventories (Registration status on substances): No data available

16. Other information

Hazardous Materials Information Label (HMIS)

Health:	1
Flammability:	3
Physical Hazard:	0
Personal Protection:	I

NFPA Hazard Ratings

Health:	1
Flammability:	3
Reactivity:	0
Unique Hazard:	---

Changes

Revision date:	03/26/2019
Revision No:	1,30

This version replaces all former issues.

Changes made in this revision see section: 2, 16.

Abbreviations and acronyms

ATE: Acute Toxicity Estimate.
CAS: Chemical Abstracts Service.
CLP: Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008.
C&L: Classification & Labeling.
DNEL: Derived No-Effect Level.
EC50: Effective concentration, 50 percent.
ECHA: European Chemicals Agency.
EINECS: European Inventory of Existing Commercial Chemical Substances.
ELINCS: European List of Notified Chemical Substances.
GHS: Globally Harmonized System of Classification and Labelling of Chemicals.
HSPA: Hydrocarbon Solvents Producers Association.
IATA: International Air Transport Association.
IBC-Code: International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (International Bulk Chemical Code).

IC50 / ErC50: Inhibitory concentration, 50 percent.
ICAO-TI: International Civil Aviation Organization Technical Instruction.
IMDG-Code: International Maritime Dangerous Goods Code.
ISO: A standard of International Standards Organisation.
IUPAC: International Union for Pure and Applied Chemistry.
LC50: Lethal concentration, 50 percent.
LD50: Lethal Dose, 50 percent.
log Kow (Pow): octanol-water partition coefficient.
LQ: Limited Quantities.
MARPOL: Maritime Polluntion Convention (Convention for the Prevention of Pollution from Ships).
OC: Operational Conditions.
OECD: Organisation for Economic Co-operation and Development.
OSHA: Occupational Safety and Health Agency.
PBT: Persistent, bioaccumulabe and toxic.
PEC: Predicted Effect Concentration.
PNEC: Predicted No-Effect Concentration.
PPE: Personal Protection Equipment.
(Q)SAR: Quantitative-Structure-Activity-Relationship.
RMM: Risk Management Measure.
STOT - RE: Specific Target Organ Toxicity - Repeated Exposure.
STOT - SE: Specific Target Organ Toxicity - Single Exposure.
UN: United Nations.
UVCB: Substances of Unknown or Variable composition, Complex reaction products or Biological materials.
vPvB: Very persistent and very bioaccumulable.
WoE: Weight of Evidence.

For abbreviations and acronyms, see table at http://abbrev.esdscom.eu

Other data

Key literature references and sources for data:
The classification corresponds to current EC-lists, but is completed by statements of technical literature and company data.

Other public accessible sources:
Hazard Communication Standard (HCS 2012) according to 29 CFR 1910.1200 in the valid version in each case (https://www.ecfr.gov/)

Further information and practical guides on the internet:
eChemPortal (http://www.echemportal.org)
Environmental Protection Agency - EPA (http://www.epa.gov) / ECOTOX-Database (http://cfpub.epa.gov/ecotox)

Recommended restriction of application:
See under section 1.2 - Uses advised against.
Use this product only for intended purpose in accordance with our product informations.
Please refer to our internet website for more information (http://www.acmos.com).

Training advice:
Yearly briefing and instruction of employees by means of of operation instructions according to article 8 of EC-directive 98/24/EC.

Inquiry office: Laboratory (Division: Occupational- /Product security)
Contact person: Mr. Dryhaus (Telephone: 01149-421-5189-0, Telefax: 01149-421-5189-871)
Office hours: Mo - Th from 7.30 - 16.15 h and Fr from 7.30 - 13.30 h. Out of office hours no call diversion.

Disclaimer:
The information is based on the present level of our knowledge. It does not, however, give assurance of product properties and establishes no contract legal rights. The information contained herein are, to our knowledge at the time of their creation to be correct and been taken from sources deemed to be reliable. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release The receiver of our product is singularly responsible for adhering to existing laws and regulations. All descriptions are approximate values, they are not specified for construction of specifications. This safety data sheet does not represent any operating instruction according to national chemical regulations. It may be used for creation, but must not replace it. The employer is not relieved from his duties. All technical information to occupational protection are directed predominately to experts first (safety engineers, occupational medicines).

Craig Schmeisser

From: Butler, Eddie, FW-NA <Eddie.Butler@fritzwinter.us>
Sent: Tuesday, January 4, 2022 8:01 AM
To: Craig Schmeisser
Cc: McCarty, Joseph, FW-NA
Subject: FW: Acmos 118-63 SDS and VOC content
Attachments: ACMOS 118-63USA-en-PN118-63.US.pdf

Info so far…

Eddie G Butler
EHS Manager
1 Fritz Winter Drive
Franklin, Kentucky 42134
Eddie.Butler@fritzwinter.us
Ofc: 270-813-4000 Ext 172

Best regards / Mit freundlichen Grüßen / Meilleures salutations

Eddie Butler
EHS Manager

Fritz Winter North America LP
1 Fritz Winter Drive
Franklin KY 42134
Vereinigte Staaten

Telephone number +1 270-813-4000 ext. 172
Mail: Eddie.Butler@fritzwinter.us
http://www.fritzwinter.com

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From: Info Acmos <info@acmosinc.com>
Sent: Monday, January 3, 2022 7:17 AM
To: Butler, Eddie, FW-NA <Eddie.Butler@fritzwinter.us>
Subject: Acmos 118-63 SDS and VOC content

Morning Eddie,

I am following up on your request. The latest MSDS is to be found in the attachment. VOC content is 84 % (622 g/l).

If you have any additional questions, please let us know.

Thank you!

Alyssa

Sincerely,

Alyssa Boehringer
Office Manager
724-220-6644 **Office**
724-713-8934 **Mobile**
alyssa@acmosinc.com

ACMOS INC.
5000 Stonewood Drive, Suite 200
Wexford PA 15090
www.acmos.com

SAFETY DATA SHEET

1. Identification

Product identifier **NixStix CB/NB FastDry**

Other means of identification

SDS number 300000011623

Material Number 362305

Recommended use Release Agent for Foundry Patterns and Dies

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name HA International, LLC

Address 630 Oakmont Lane
Westmont, IL 60559
United States

Telephone

General Assistance	(630) 575-5700
EH&S	(630) 575-5705
Regulatory Affairs	(630) 575-5722
Customer Service	(800)323-6863

Website www.ha-international.com

E-mail msdsquestions@ha-international.com

Contact person Jacqueline Ramirez 630-575-5722, Jeff Krause 630-575-5705

Emergency phone number

Medical Emergency	(303)-389-1396
Toll Free	(866)595-5738

2. Hazard(s) identification

Physical hazards	Flammable liquids	Category 2
Health hazards	Serious eye damage/eye irritation	Category 2A
	Germ cell mutagenicity	Category 1B
	Carcinogenicity	Category 1B
	Aspiration hazard	Category 1
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 2
	Hazardous to the aquatic environment, long-term hazard	Category 2
OSHA defined hazards	Not classified.	

Label elements

Signal word Danger

Hazard statement Highly flammable liquid and vapor. May be fatal if swallowed and enters airways. Causes serious eye irritation. May cause genetic defects. May cause cancer. Toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Precautionary statement

Prevention	This is a hazardous chemical product. It is important that all employees working with this product receive initial and periodic refresher training in its safe use and handling, both for basic risk management purposes and for compliance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200. Model training materials are available upon request for many of our products. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wash thoroughly after handling. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.
Response	If swallowed: Immediately call a poison center/doctor. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If exposed or concerned: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. In case of fire: Use appropriate media to extinguish. Collect spillage.
Storage	Store in a well-ventilated place. Keep cool. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	Static accumulating flammable liquid can become electrostatically charged even in bonded and grounded equipment. Sparks may ignite liquid and vapor. May cause flash fire or explosion.
Supplemental information	100% of the mixture consists of component(s) of unknown acute oral toxicity. 100% of the mixture consists of component(s) of unknown acute dermal toxicity. 15% of the mixture consists of component(s) of unknown acute inhalation toxicity. 2.5% of the mixture consists of component(s) of unknown acute hazards to the aquatic environment. 2.5% of the mixture consists of component(s) of unknown long-term hazards to the aquatic environment.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Light Aliphatic Solvent Naphtha (petroleum)		64742-89-8	80 - < 90*
"Siloxanes and Silicones, Di-Me"		63148-62-9	10 - < 20*
Other components below reportable levels			1 - < 3

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Take off immediately all contaminated clothing. Rinse skin with water/shower. Get medical attention if irritation develops and persists.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.
Ingestion	Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Most important symptoms/effects, acute and delayed	Aspiration may cause pulmonary edema and pneumonitis. Dizziness. Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Thermal burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim under observation. Symptoms may be delayed.
General information	Take off all contaminated clothing immediately. IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Carbon dioxide (CO2). Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical	Vapors may form explosive mixtures with air. Vapors may travel considerable distance to a source of ignition and flash back. This product is a poor conductor of electricity and can become electrostatically charged. If sufficient charge is accumulated, ignition of flammable mixtures can occur. To reduce potential for static discharge, use proper bonding and grounding procedures. This liquid may accumulate static electricity when filling properly grounded containers. Static electricity accumulation may be significantly increased by the presence of small quantities of water or other contaminants. Material will float and may ignite on surface of water. During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	Highly flammable liquid and vapor.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Use appropriate containment to avoid environmental contamination. Transfer by mechanical means such as vacuum truck to a salvage tank or other suitable container for recovery or safe disposal. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep combustibles (wood, paper, oil, etc.) away from spilled material. Take precautionary measures against static discharge. Use only non-sparking tools. This product is miscible in water. This material is classified as a water pollutant under the Clean Water Act and should be prevented from contaminating soil or from entering sewage and drainage systems which lead to waterways. Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Following product recovery, flush area with water. Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. Put material in suitable, covered, labeled containers. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground. Use appropriate containment to avoid environmental contamination.

7. Handling and storage

Precautions for safe handling	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. When using do not smoke. Explosion-proof general and local exhaust ventilation. Minimize fire risks from flammable and combustible materials (including combustible dust and static accumulating liquids) or dangerous reactions with incompatible materials. Handling operations that can promote accumulation of static charges include but are not limited to: mixing, filtering, pumping at high flow rates, splash filling, creating mists or sprays, tank and container filling, tank cleaning, sampling, gauging, switch loading, vacuum truck operations. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. Avoid contact with eyes. Avoid prolonged exposure. Should be handled in closed systems, if possible. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices. For additional information on equipment bonding and grounding, refer to the Canadian Electrical Code in Canada, (CSA C22.1), or the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents" or National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity" or National Fire Protection Association (NFPA) 70, "National Electrical Code".

Conditions for safe storage, including any incompatibilities

Store locked up. Keep away from heat, sparks and open flame. Prevent electrostatic charge build-up by using common bonding and grounding techniques. Eliminate sources of ignition. Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity. Store in a cool, dry place out of direct sunlight. Store in original tightly closed container. Store in a well-ventilated place. Keep in an area equipped with sprinklers. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit. At this time, the other constituents have no known exposure limits.

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Light Aliphatic Solvent Naphtha (petroleum) (CAS 64742-89-8)	PEL	400 mg/m3
		100 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Light Aliphatic Solvent Naphtha (petroleum) (CAS 64742-89-8)	TWA	400 mg/m3
		100 ppm

Biological limit values No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls Explosion-proof general and local exhaust ventilation. Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Provide eyewash station. Eye wash fountain and emergency showers are recommended.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin protection

Hand protection Wear appropriate chemical resistant gloves.

Other Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection Respiratory protection is not normally required for general core room workers when sufficient ventilation is provided to consistently maintain exposures below acceptable exposure criteria. Periodic exposure monitoring should be conducted to ensure exposures remain below relevant criteria. Use respiratory protection consisting of a chemical-specific cartridge respirator or supplied air respirator when performing line breaks, liquid transfers, or other operations where exposure to liquid or elevated vapor concentrations is possible.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Observe any medical surveillance requirements. When using do not smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state Liquid.

Form Liquid

Color Clear, colorless

Odor Solvent

Odor threshold Not available.

pH Not available.

pH concentration Not Available

Melting point/freezing point Not Available

Initial boiling point and boiling range	195.8 - 210.2 °F (91 - 99 °C)
Flash point	> 19.9 °F (> -6.7 °C) Setaflash Closed Cup
Evaporation rate	Not Available
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	1 % (V) (Solvent)
Explosive limit - upper (%)	8 % (V) (Solvent)
Vapor pressure	< 40 mm Hg Approximate (Solvent)
Vapor density	Not Available
Relative density	0.72 - 0.73
Solubility(ies)	
Solubility (water)	Not Available
Partition coefficient (n-octanol/water)	Not Available
Auto-ignition temperature	550 °F (287.78 °C) estimated
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Dynamic viscosity	Not Available
Explosive properties	Not explosive.
Flammability class	Flammable IB estimated
Oxidizing properties	Not oxidizing.
Thermal hazards	
Relative self-ignition temperature	Not Available

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Avoid heat, sparks, open flames and other ignition sources. Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Prolonged inhalation may be harmful.
Skin contact	No adverse effects due to skin contact are expected.
Eye contact	Causes serious eye irritation.
Ingestion	Droplets of the product aspirated into the lungs through ingestion or vomiting may cause a serious chemical pneumonia.
Symptoms related to the physical, chemical and toxicological characteristics	Aspiration may cause pulmonary edema and pneumonitis. Dizziness. Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision.

Information on toxicological effects

Acute toxicity	May be fatal if swallowed and enters airways.
Skin corrosion/irritation	Prolonged skin contact may cause temporary irritation.
Serious eye damage/eye irritation	Causes serious eye irritation.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity May cause genetic defects.

Carcinogenicity May cause cancer.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Not regulated.

US. National Toxicology Program (NTP) Report on Carcinogens

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard May be fatal if swallowed and enters airways.

Chronic effects Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity Toxic to aquatic life with long lasting effects.

Components		Species	Test Results
"Siloxanes and Silicones, Di-Me" (CAS 63148-62-9)			
Aquatic			
Fish	LC50	Channel catfish (Ictalurus punctatus)	2.36 - 4.15 mg/l, 96 hours
Light Aliphatic Solvent Naphtha (petroleum) (CAS 64742-89-8)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia pulex)	2.7 - 5.1 mg/l, 48 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	8.8 mg/l, 96 hours
			8.8 mg/l, 96 hours

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available.

Mobility in soil No data available.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number UN1206

UN proper shipping name Heptanes solution

Transport hazard class(es)

Class	3
Subsidiary risk	-
Packing group	II

Environmental hazards

Marine pollutant	Yes

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Transport hazard class(es)

Label(s)	3

ERG 128

Transport hazard class(es)

Marine pollutant	Light Aliphatic Solvent Naphtha (petroleum)
Marine pollutant	"Siloxanes and Silicones, Di-Me"

TDG

UN number	UN1206
UN proper shipping name	HEPTANES SOLUTION

Transport hazard class(es)

Class	3
Subsidiary risk	-
Packing group	II

Special precautions for users Read safety instructions, SDS and emergency procedures before handling.

Transport Hazard Class(es)

Marine pollutant	Not applicable.
Marine pollutant	Not applicable.

IATA

UN number	UN1206
UN proper shipping name	Heptanes solution

Transport hazard class(es)

Class	3
Subsidiary risk	-
Packing group	II

Environmental hazards

Marine pollutant	No.

ERG Code 3H

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Other information

Passenger and cargo aircraft	Allowed with restrictions.
Cargo aircraft only	Allowed with restrictions.

IMDG

UN number	UN1206
UN proper shipping name	HEPTANES SOLUTION

Transport hazard class(es)

Class	3
Subsidiary risk	-
Packing group	II

Environmental hazards

Marine pollutant	Yes

EmS F-E, S-D

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Transport hazard class(es)

Marine pollutant	Light Aliphatic Solvent Naphtha (petroleum)
Marine pollutant	"Siloxanes and Silicones, Di-Me"

DOT

IATA; IMDG; TDG

General information IMDG Regulated Marine Pollutant. DOT Regulated Marine Pollutant.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

Classified hazard categories
Flammable (gases, aerosols, liquids, or solids)
Serious eye damage or eye irritation
Germ cell mutagenicity
Carcinogenicity
Aspiration hazard
Hazard not otherwise classified (HNOC)

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 2016 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

Light Aliphatic Solvent Naphtha (petroleum) (CAS 64742-89-8)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Toxic Chemical Substances (TCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 01-12-2015

Revision date 09-27-2018

Version # 04

HMIS® ratings Health: 3*
Flammability: 3
Physical hazard: 0

NFPA ratings Health: 2
Flammability: 3
Instability: 0

NFPA ratings

Disclaimer HA International, LLC cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE, except that the product shall conform to contracted specifications, and that the product does not infringe any valid United States or Canadian patent. No claim of any kind shall be greater in amount than the purchase price of the quantity of product in respect of which damages are claimed. In no event shall Seller be liable for incidental or consequential damages, whether Buyer's claim is based on contract, breach of warranty, negligence or otherwise.

Revision information

Hazard(s) identification: Response
Hazard(s) identification: Hazard statement
Hazard(s) identification: Hazard(s) not otherwise classified (HNOC)
First-aid measures: Eye contact
Accidental release measures: Personal precautions, protective equipment and emergency procedures
Accidental release measures: Methods and materials for containment and cleaning up
Handling and storage: Conditions for safe storage, including any incompatibilities
Exposure controls/personal protection: Hand protection
Exposure controls/personal protection: Other
Exposure controls/personal protection: PPE Symbols
Transport Information: Proper Shipping Name/Packing Group
Transport information: General information
Regulatory information: California Proposition 65
Other information, including date of preparation or last revision: References

Craig Schmeisser

From: Krause, Jeffrey <jeff.krause@ha-international.com>
Sent: Monday, January 3, 2022 9:05 AM
To: Craig Schmeisser
Cc: Eddie Butler
Subject: RE: HA NixStix CB/NB Fast Dry - VOC Content

85% by weight, Craig.

Best wishes for a happy new year!

Jeff Krause
Director, EH&S
HA International, LLC
(630) 575-5705 (w)
(773)263-2355 (m)
Jeff.Krause@HA-International.com

From: Craig Schmeisser [mailto:craig.schmeisser@madriverstrategies.com]
Sent: Thursday, December 30, 2021 11:43 AM
To: Krause, Jeffrey <jeff.krause@ha-international.com>
Cc: Eddie Butler <eddie.butler@fritzwinter.us>
Subject: HA NixStix CB/NB Fast Dry - VOC Content

Hi Jeff and Happy Holidays,
Can you provide the expected VOC content of you HA NixStix CB/NB Fast Dry product? Early next week is fine. Thank you.

Craig S. Schmeisser
Mad River Strategies, LLC
craig.schmeisser@madriverstrategies.com
614.425.6392

Safety Data Sheet
KERNTOP WV 031 111 COATING IBC716 FW

SECTION 1. IDENTIFICATION

Product name	:	KERNTOP WV 031 111 COATING IBC716 FW
Material	:	852674

Manufacturer or supplier's details

Company	:	ASK CHEMICALS LLC
Address	:	495 Metro Place South Suite 250 Dublin, OH 43017 United States of America
Emergency telephone number	:	1-855-ASK4YOU (1-855-275-4968)
E-mail address	:	EHSRequests.usa@ask-chemicals.com

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Skin irritation	:	Category 2
Eye irritation	:	Category 2A
Carcinogenicity	:	Category 1A

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H315 Causes skin irritation.
H319 Causes serious eye irritation.
H350 May cause cancer.

Precautionary statements : **Prevention:**
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.

P362 Take off contaminated clothing and wash before reuse.
Storage:
P405 Store locked up.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous components

Chemical name	CAS-No.	Concentration (%)
MICA	12001-26-2	>= 10 - < 20
PYROPHYLLITE	12269-78-2	>= 5 - < 10
QUARTZ / SAND	14808-60-7	>= 1 - < 5
GRAPHITE	7782-42-5	>= 1 - < 5
ATTAPULGITE	12174-11-7	>= 1 - < 5
KAOLIN	1332-58-7	>= 1 - < 5

SECTION 4. FIRST AID MEASURES

General advice : Consult a physician.

If inhaled : Remove person to fresh air. If signs/symptoms continue, get medical attention.

In case of skin contact : Take off contaminated clothing and shoes immediately.
If on skin, rinse well with water.
If on clothes, remove clothes.

In case of eye contact : Remove contact lenses.
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

If swallowed : If swallowed, DO NOT induce vomiting unless directed to do so by medical personnel.

Most important symptoms and effects, both acute and delayed : None known.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Specific hazards during firefighting : Do not use a solid water stream as it may scatter and spread fire.

Cool closed containers exposed to fire with water spray.

Special protective equipment for firefighters : In the event of fire, wear self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures : Use personal protective equipment.
Ensure adequate ventilation.
Evacuate personnel to safe areas.
Keep people away from and upwind of spill/leak.
Material can create slippery conditions.

Environmental precautions : Local authorities should be advised if significant spillages cannot be contained.

Methods and materials for containment and cleaning up : Keep in suitable, closed containers for disposal.
Clean contaminated floors and objects thoroughly while observing environmental regulations.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling : Avoid contact with skin and eyes.
For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the application area.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
MICA	12001-26-2	TWA (Respirable fraction)	3 mg/m3	ACGIH
		TWA (Respirable)	3 mg/m3	NIOSH REL
		TWA (Dust)	20 Million particles per cubic foot	OSHA Z-3
		TWA (Respirable fraction)	3 mg/m3	OSHA P0
		TWA (Respirable)	3 mg/m3	NIOSH REL
		TWA (respirable dust fraction)	3 mg/m3	OSHA P0
		PEL (Respirable dust)	3 mg/m3	CAL PEL
QUARTZ / SAND	14808-60-7	TWA (Res-	0.025 mg/m3	ACGIH

		pirable fraction)		
		TWA (total dust)	30 mg/m3/%SiO2+2	OSHA Z-3
		TWA (respirable)	10 mg/m3/%SiO2+2	OSHA Z-3
		TWA (respirable)	250 mppcf/%SiO2+5	OSHA Z-3
		TWA (Respirable dust)	0.05 mg/m3	NIOSH REL
		TWA (Respirable fraction)	0.1 mg/m3	OSHA P0
		TWA (Respirable dust)	0.05 mg/m3	OSHA Z-1
		PEL (Respirable dust)	0.05 mg/m3	CAL PEL
		TWA (respirable dust fraction)	0.1 mg/m3	OSHA P0
		TWA (Respirable fraction)	0.025 mg/m3 (Silica)	ACGIH
		TWA (Respirable dust)	0.05 mg/m3 (Silica)	NIOSH REL
GRAPHITE	7782-42-5	TWA (Respirable)	2.5 mg/m3	NIOSH REL
		TWA (Dust)	15 Million particles per cubic foot	OSHA Z-3
		TWA (Total)	10 mg/m3	OSHA P0
		TWA (Respirable fraction)	5 mg/m3	OSHA P0
		TWA (total dust)	15 mg/m3	OSHA Z-1
		TWA (respirable fraction)	5 mg/m3	OSHA Z-1
		TWA (Respirable fraction)	2 mg/m3	ACGIH
		TWA (Respirable fraction)	2.5 mg/m3	OSHA P0
		TWA (Total dust)	10 mg/m3	OSHA P0
		TWA (respirable dust fraction)	5 mg/m3	OSHA P0
		PEL (Total dust)	10 mg/m3	CAL PEL
		PEL (respirable dust fraction)	5 mg/m3	CAL PEL
		TWA (respirable dust	2.5 mg/m3	OSHA P0

		fraction)		
		PEL (Respirable dust)	2.5 mg/m3	CAL PEL
KAOLIN	1332-58-7	TWA (Respirable fraction)	2 mg/m3	ACGIH
		TWA (Respirable)	5 mg/m3	NIOSH REL
		TWA (total)	10 mg/m3	NIOSH REL
		TWA (total dust)	15 mg/m3	OSHA Z-1
		TWA (respirable fraction)	5 mg/m3	OSHA Z-1
		TWA (Total)	10 mg/m3	OSHA P0
		TWA (Respirable fraction)	5 mg/m3	OSHA P0
		TWA (Total dust)	10 mg/m3	OSHA P0
		TWA (respirable dust fraction)	5 mg/m3	OSHA P0
		PEL (Respirable dust)	2 mg/m3	CAL PEL

Hazardous components without workplace control parameters

Components	CAS-No.
PYROPHYLLITE	12269-78-2
ATTAPULGITE	12174-11-7

Personal protective equipment

Eye protection : Safety goggles

Protective measures : Wear suitable protective equipment.
Avoid contact with skin.
When using do not eat, drink or smoke.

Hygiene measures : Avoid contact with skin, eyes and clothing.
Wash hands before breaks and immediately after handling the product.
Remove contaminated clothing and protective equipment before entering eating areas.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid

Colour : no data available

Odour : no data available

Odour Threshold : no data available

pH : no data available

Melting point	:	no data available
Boiling point	:	no data available
Flash point	:	not applicable
Evaporation rate	:	no data available
Flammability (solid, gas)	:	no data available
Burning rate	:	no data available
Upper explosion limit	:	no data available
Lower explosion limit	:	no data available
Vapour pressure	:	no data available
Relative vapour density	:	no data available
Relative density	:	no data available
Density	:	1.349 g/cm3
Bulk density	:	no data available
Solubility(ies)		
Water solubility	:	no data available
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Decomposition temperature	:	no data available
Viscosity		
Viscosity, dynamic	:	no data available
Viscosity, kinematic	:	no data available

SECTION 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Skin Absorption

Acute toxicity

Product:

Acute oral toxicity	:	Acute toxicity estimate: > 5,000 mg/kg Method: Calculation method

Components:

GRAPHITE:

Acute oral toxicity	:	LD50 (rat): > 2,000 mg/kg
Acute inhalation toxicity	:	Assessment: The substance or mixture has no acute inhalation toxicity

KAOLIN:

Acute oral toxicity	:	LD50 (rat): > 5,000 mg/kg
Acute dermal toxicity	:	LD50 (rat): > 5,000 mg/kg

Skin corrosion/irritation

Components:

MICA:
Assessment: No skin irritation
Result: No skin irritation

PYROPHYLLITE:
Assessment: Irritating to skin.
Result: Irritating to skin.

QUARTZ / SAND:
Assessment: Irritating to skin.
Result: Irritating to skin.

GRAPHITE:
Assessment: No skin irritation
Result: No skin irritation

ATTAPULGITE:
Assessment: Irritating to skin.
Result: Irritating to skin.

KAOLIN:
Assessment: No skin irritation
Result: No skin irritation

Serious eye damage/eye irritation

Components:

MICA:
Result: No eye irritation
Assessment: No eye irritation

PYROPHYLLITE:
Result: Mild eye irritation
Assessment: Mild eye irritation

QUARTZ / SAND:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

GRAPHITE:
Result: No eye irritation
Assessment: No eye irritation

ATTAPULGITE:
Result: Irritating to eyes.
Assessment: Irritating to eyes.

KAOLIN:
Result: No eye irritation
Assessment: No eye irritation

Respiratory or skin sensitisation

Components:
GRAPHITE:
Species: mouse
Result: Did not cause sensitisation on laboratory animals.

Germ cell mutagenicity

Components:
GRAPHITE:
Genotoxicity in vitro : Remarks: In vitro tests did not show mutagenic effects

Carcinogenicity

Components:
QUARTZ / SAND:
Carcinogenicity - Assessment : Human carcinogen.

ATTAPULGITE:
Carcinogenicity - Assessment : Limited evidence of a carcinogenic effect.

KAOLIN:
Carcinogenicity - Assessment : Possible human carcinogen

IARC	Group 1: Carcinogenic to humans	
	QUARTZ / SAND	14808-60-7
	KAOLIN	1332-58-7
	Group 2B: Possibly carcinogenic to humans	
	ATTAPULGITE	12174-11-7

OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.	
NTP	Known to be human carcinogen	
	QUARTZ / SAND	14808-60-7
	KAOLIN	1332-58-7

Reproductive toxicity

Components:

GRAPHITE:

Effects on fertility	:	Species: rat Application Route: Oral Symptoms: No effects on reproduction parameters.
Effects on foetal development	:	Species: rat Application Route: Oral Symptoms: No specific developmental abnormalities. Method: OECD Test Guideline 422

Further information

Components:

QUARTZ / SAND:
Remarks: Lungs

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

GRAPHITE:

Toxicity to fish	:	LC 50 (Danio rerio (zebra fish)): > 100 mg/l Exposure time: 96 h Test Type: semi-static test Method: OECD Test Guideline 203
Toxicity to daphnia and other aquatic invertebrates	:	EC 50 (Daphnia): > 100 mg/l Exposure time: 48 h Test Type: static test Method: OECD Test Guideline 202
Toxicity to algae	:	NOEC (Pseudokirchneriella subcapitata (green algae)): > 100 mg/l Exposure time: 72 h Test Type: static test

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of wastes in an approved waste disposal facility. Dispose of in accordance with all applicable local, state and federal regulations.

SECTION 14. TRANSPORT INFORMATION

REGULATION
U.S. DOT - ROAD
Not regulated as a dangerous good

U.S. DOT - RAIL
Not regulated as a dangerous good

U.S. DOT - INLAND WATERWAYS
Not regulated as a dangerous good

TRANSPORT CANADA - ROAD
Not regulated as a dangerous good

TRANSPORT CANADA - RAIL
Not regulated as a dangerous good

TRANSPORT CANADA - INLAND WATERWAYS
Not regulated as a dangerous good

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES
Not regulated as a dangerous good

INTERNATIONAL MARITIME DANGEROUS GOODS
Not regulated as a dangerous good

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO

Not regulated as a dangerous good

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

SECTION 15. REGULATORY INFORMATION

TSCA list : The following substance(s) is/are subject to a Significant New Use Rule:

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
METHANOL	67-56-1	5000	*
METHANOL	67-56-1	100	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards : Acute Health Hazard
Chronic Health Hazard

SARA 302 : SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 : SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

California Prop 65

WARNING! This product contains a chemical known to the State of California to cause cancer.

QUARTZ / SAND	14808-60-7
ATTAPULGITE	12174-11-7
KAOLIN	1332-58-7
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	64742-47-8
1,4-DIOXANE	123-91-1
ETHYLENE OXIDE	75-21-8

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

METHANOL	67-56-1
ETHYLENE OXIDE	75-21-8

The components of this product are reported in the following inventories:

DSL : All components of this product are on the Canadian DSL.

AICS	:	Not in compliance with the inventory
NZIoC	:	On the inventory, or in compliance with the inventory
ENCS	:	Not in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PICCS	:	On the inventory, or in compliance with the inventory
IECSC	:	On the inventory, or in compliance with the inventory
TCSI	:	Not in compliance with the inventory
TSCA	:	On TSCA Inventory

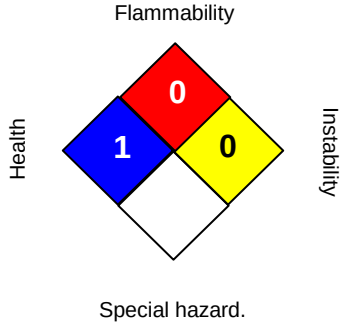
Inventories

AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TSCA (USA)

SECTION 16. OTHER INFORMATION

Further information

NFPA:



HMIS III:

HEALTH	1*
FLAMMABILITY	0
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by ASK's Environmental Health and Safety Department-- EHSrequests.USA@ask-chemicals.com.

Revision Date : 11/01/2018

Craig Schmeisser

From: Horvath, Lee <LEE.HORVATH@ask-chemicals.com>
Sent: Monday, August 2, 2021 3:57 PM
To: Craig Schmeisser
Subject: RE: VOC content - Kerntop WV 031 111

I take that back Craig, its actually <0.1% for this product ! ! !

Let me know if you need anything else.

Best Regards,

Lee R Horvath
Business Line Manager – Coatings/Additives, Auxiliaries, Feeding Systems & Metallurgy
lee.horvath@ask-chemicals.com
Office: 614-763-0244
Cell: 440-570-1817

Lee Horvath
Business Line Manager – Coatings, Additives, & Auxiliaries

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For further information on data privacy please refer to our privacy notice: https://www.ask-chemicals.com/data-protection

Please consider the environment before printing this e-mail!

From: Horvath, Lee
Sent: Monday, August 2, 2021 3:55 PM
To: Craig Schmeisser <craig.schmeisser@madriverstrategies.com>
Subject: RE: VOC content - Kerntop WV 031 111

Craig,

It would have a very small amount, probably <0.25%

Do you need an exact number? If so, it will take a day or two to get that number.

Let me know.

Best Regards,

Lee R Horvath
Business Line Manager – Coatings/Additives, Auxiliaries, Feeding Systems & Metallurgy
lee.horvath@ask-chemicals.com
Office: 614-763-0244
Cell: 440-570-1817

From: Craig Schmeisser <craig.schmeisser@madriverstrategies.com>
Sent: Monday, August 2, 2021 1:55 PM
To: Horvath, Lee <LEE.HORVATH@ask-chemicals.com>
Subject: VOC content - Kerntop WV 031 111

Hi Lee,
For the core wash used at Fritz Winter, can you tell me if the attached has any VOCs associated with the material. Thanks.

mad river strategies llc
Craig S. Schmeisser
Mad River Strategies, LLC
craig.schmeisser@madriverstrategies.com
614.425.6392

SAFETY DATA SHEET

Section 1. Identification

Product name Rustilo 4175

SDS # 458532

Historic SDS #: 09027

Code 458532-US03

Relevant identified uses of the substance or mixture and uses advised against

Product use Rust preventive
For specific application advice see appropriate Technical Data Sheet or consult our company representative.

Supplier BP Lubricants USA Inc.
1500 Valley Road
Wayne, NJ 07470
Telephone: +1-888-CASTROL
Product Information: +1-877-641-1600

EMERGENCY HEALTH INFORMATION: +1-800-447-8735

EMERGENCY SPILL INFORMATION: +1-800-424-9300 (CHEMTREC USA)
+1-703-527-3887 (CHEMTREC outside the US)

Section 2. Hazards identification

OSHA/HCS status This material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture Not classified.

GHS label elements

Signal word No signal word.

Hazard statements No known significant effects or critical hazards.

Precautionary statements

Prevention Not applicable.

Response Not applicable.

Storage Not applicable.

Disposal Not applicable.

Hazards not otherwise classified Defatting to the skin.

Section 3. Composition/information on ingredients

Substance/mixture Mixture

Corrosion inhibitors and additives in aqueous solution.

Ingredient name	CAS number	%
Triethanolamine	102-71-6	≤10
Boric acid	10043-35-3	≤3

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

Section 3. Composition/information on ingredients

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Check for and remove any contact lenses. Get medical attention.

Skin contact
Wash skin thoroughly with soap and water or use recognized skin cleanser. Remove contaminated clothing and shoes. Wash clothing before reuse. Get medical attention if symptoms occur. Clean shoes thoroughly before reuse.

Inhalation
If inhaled, remove to fresh air. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours. Get medical attention if symptoms occur.

Ingestion
Do not induce vomiting unless directed to do so by medical personnel. Wash out mouth with water if person is conscious. Get medical attention if symptoms occur.

Protection of first-aiders
No action shall be taken involving any personal risk or without suitable training.

Most important symptoms/effects, acute and delayed

See Section 11 for more detailed information on health effects and symptoms.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician
Treatment should in general be symptomatic and directed to relieving any effects.
In case of inhalation of decomposition products in a fire, symptoms may be delayed.
The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments
No specific treatment.

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media
In case of fire, use water fog, alcohol resistant foam, dry chemical or carbon dioxide extinguisher or spray.

Unsuitable extinguishing media
Do not use water jet.

Specific hazards arising from the chemical
In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous combustion products
Combustion products may include the following:
phosphorus oxides
carbon oxides (CO, CO_2) (carbon monoxide, carbon dioxide)
nitrogen oxides (NO, NO_2 etc.)

Special protective actions for fire-fighters
No action shall be taken involving any personal risk or without suitable training. Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire.

Special protective equipment for fire-fighters
Fire-fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Put on appropriate personal protective equipment. Floors may be slippery; use care to avoid falling.

For emergency responders

If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions

Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill

Stop leak if without risk. Move containers from spill area. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill

Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations. Dispose of via a licensed waste disposal contractor.

Section 7. Handling and storage

Precautions for safe handling

Protective measures

Put on appropriate personal protective equipment (see Section 8). Avoid breathing vapor or mist. Avoid contact of spilled material and runoff with soil and surface waterways. Avoid prolonged or repeated contact with skin. During metal working, solid particles from workpieces or tools will contaminate the fluid and may cause abrasions of the skin. Where such abrasions result in a penetration of the skin, first aid treatment should be applied as soon as reasonably possible. The presence of certain metals in the workpiece or tool, such as chromium, cobalt and nickel, can contaminate the metalworking fluid and as a result may induce allergic skin reactions. Evaporation of water from soluble cutting fluids during use may lead to an increase in concentration which may result in the development of skin conditions due to irritation and defatting. It is important to monitor fluid strength on a regular basis with a refractometer and maintain it at the recommended concentration. Lubricants from other sources and other contaminants should be minimized. Swarf and other debris should be removed. To maintain optimum performance and minimize bacterial spoilage, machine tool coolant systems should be cleaned on a regular basis.

Advice on general occupational hygiene

Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Wash thoroughly after handling. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities

Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Store and use only in equipment/containers designed for use with this product. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. DO NOT ADD NITRITES TO THIS FLUID.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Triethanolamine	**ACGIH TLV (United States).** TWA: 5 mg/m³ 8 hours. Issued/Revised: 9/1994
Boric acid	**ACGIH TLV (United States).** STEL: 6 mg/m³ 15 minutes. Issued/Revised: 1/2005 Form: Inhalable fraction TWA: 2 mg/m³ 8 hours. Issued/Revised: 1/2005 Form: Inhalable fraction

While specific OELs for certain components may be shown in this section, other components may be present in any mist, vapor or dust produced. Therefore, the specific OELs may not be applicable to the product as a whole and are provided for guidance only.

Appropriate engineering controls

All activities involving chemicals should be assessed for their risks to health, to ensure exposures are adequately controlled. Personal protective equipment should only be considered after other forms of control measures (e.g. engineering controls) have been suitably evaluated. Personal protective equipment should conform to appropriate standards, be suitable for use, be kept in good condition and properly maintained.
Your supplier of personal protective equipment should be consulted for advice on selection and appropriate standards. For further information contact your national organisation for standards.
Provide exhaust ventilation or other engineering controls to keep the relevant airborne concentrations below their respective occupational exposure limits.
The final choice of protective equipment will depend upon a risk assessment. It is important to ensure that all items of personal protective equipment are compatible.

Environmental exposure controls

Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures

Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period.
Appropriate techniques should be used to remove potentially contaminated clothing.
Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection

Undiluted fluid: Chemical goggles.
Diluted fluid: Safety glasses with side shields.

Skin protection

Hand protection

Wear suitable gloves. Undiluted fluid: Wear chemical resistant gloves. Recommended: nitrile gloves.
Diluted fluid: Wear protective gloves if prolonged or repeated contact is likely.
Recommended: nitrile gloves. The correct choice of protective gloves depends upon the chemicals being handled, the conditions of work and use, and the condition of the gloves (even the best chemically resistant glove will break down after repeated chemical exposures). Most gloves provide only a short time of protection before they must be discarded and replaced. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Gloves should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions.

Body protection

Use of protective clothing is good industrial practice.
Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Cotton or polyester/cotton overalls will only provide protection against light superficial contamination that will not soak through to the skin. Overalls should be laundered on a regular basis. When the risk of skin exposure is high (e.g. when cleaning up spillages or

Section 8. Exposure controls/personal protection

if there is a risk of splashing) then chemical resistant aprons and/or impervious chemical suits and boots will be required.

Other skin protection

Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection

In case of insufficient ventilation, wear suitable respiratory equipment.
For protection against metal working fluids, respiratory protection that is classified as “resistant to oil” (class R) or oil proof (class P) should be selected where appropriate. Depending on the level of airborne contaminants, an air-purifying, half-mask respirator (with HEPA filter) including disposable (P- or R-series) (for oil mists less than 50mg/m3), or any powered, air-purifying respirator equipped with hood or helmet and HEPA filter (for oil mists less than 125 mg/m3).
Where organic vapours are a potential hazard during metalworking operations, a combination particulate and organic vapour filter may be necessary.
The correct choice of respiratory protection depends upon the chemicals being handled, the conditions of work and use, and the condition of the respiratory equipment. Safety procedures should be developed for each intended application. Respiratory protection equipment should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions.

Section 9. Physical and chemical properties

Appearance

Physical state Liquid.

Color Yellow. [Light]

Odor Not available.

Odor threshold Not available.

pH 9.1 [Conc. (% w/w): 5%]

Melting point Not available.

Boiling point Not available.

Flash point Closed cup: >100°C (>212°F) [Estimated. Water content interferes with flash point determination.]

Evaporation rate Not available.

Flammability (solid, gas) Not applicable. Based on - Physical state

Lower and upper explosive (flammable) limits Not available.

Vapor pressure Not available.

Vapor density Not available.

Density >1000 kg/m³ (>1 g/cm³) at 15.6°C

Solubility Soluble in water.

Partition coefficient: n-octanol/water Not available.

Auto-ignition temperature Not available.

Decomposition temperature Not available.

Viscosity Not available.

Section 10. Stability and reactivity

Reactivity No specific test data available for this product. Refer to Conditions to avoid and Incompatible materials for additional information.

Chemical stability The product is stable.

Possibility of hazardous reactions Under normal conditions of storage and use, hazardous reactions will not occur.
Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 10. Stability and reactivity

Conditions to avoid Avoid excessive heat.

Incompatible materials Reactive or incompatible with the following materials: oxidizing materials.
Slightly reactive or incompatible with the following materials: acids.

Hazardous decomposition products Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Classification

Product/ingredient name	OSHA	IARC	NTP
Triethanolamine	-	3	-

Descriptors:

OSHA:
+ - Potential occupational carcinogen

IARC:
1 - Carcinogenic to human.
2A - Probable human carcinogen.
2B - Possible carcinogen to human.
3 - Not classifiable as a human carcinogen.
4 - Probably not a human carcinogen.

NTP:
Proven - Known to be human carcinogens.
Possible - Reasonably anticipated to be human carcinogens.

Information on the likely routes of exposure Routes of entry anticipated: Dermal, Inhalation.

Potential acute health effects

Eye contact No known significant effects or critical hazards.

Skin contact No known significant effects or critical hazards.

Inhalation Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Ingestion No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact No specific data.

Skin contact Adverse symptoms may include the following:
irritation
dryness
cracking

Inhalation No specific data.

Ingestion No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects Not available.

Potential delayed effects Not available.

Long term exposure

Potential immediate effects Not available.

Potential delayed effects Not available.

Potential chronic health effects

General No known significant effects or critical hazards.

Carcinogenicity No known significant effects or critical hazards.

Mutagenicity No known significant effects or critical hazards.

Section 11. Toxicological information

Teratogenicity No known significant effects or critical hazards.

Developmental effects No known significant effects or critical hazards.

Fertility effects No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	250027 mg/kg

Additional information Alkanolamine: This product contains an alkanolamine. In all metalworking fluids containing amines, there is a potential for forming nitrosamines which are animal carcinogens. Therefore, no nitrites or related nitrosating agents should be added to such compositions.

Section 12. Ecological information

Toxicity

No testing has been performed by the manufacturer.

Persistence and degradability

Expected to be biodegradable.

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{OC}) Not available.

Mobility Liquid. Soluble in water.

Other adverse effects No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods The generation of waste should be avoided or minimized wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Diluted Fluid The spent diluted fluid comprises a relatively stable emulsion. Dispose of via an authorised person/ licensed waste disposal contractor or by other suitable waste treatment techniques (e.g. emulsion splitting, coagulation and filtration) approved by the local authority. Spent fluid should never be disposed of down the drain. The aqueous phase should not be discharged into sewage systems unless provided for by local regulations; the non-aqueous phase should be disposed of as undiluted fluid. Note that separated aqueous solutions or effluents may contain metal salts as well as traces of oil and must be checked for conformity in these respects against consents given by the authorities before disposal. Further treatment may be required.

Section 14. Transport information

	DOT Classification	TDG Classification	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-	-
Transport hazard class(es)	-	-	-	-
Packing group	-	-	-	-
Environmental hazards	No.	No.	No.	No.
Additional information	-	-	-	-

Special precautions for user Not available.

Transport in bulk according to Annex II of MARPOL and the IBC Code Not available.

Section 15. Regulatory information

U.S. Federal regulations

United States inventory (TSCA 8b) All components are listed or exempted.

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 311/312

Classification Not applicable.

SARA 313

Form R - Reporting requirements This product does not contain any hazardous ingredients at or above regulated thresholds.

Supplier notification This product does not contain any hazardous ingredients at or above regulated thresholds.

State regulations

Massachusetts The following components are listed: TRIETHANOLAMINE

New Jersey The following components are listed: BORATE COMPOUNDS, Inorganic; TRIETHANOLAMINE; ETHANOL, 2,2',2"-NITRILOTRIS-

Pennsylvania The following components are listed: ETHANOL, 2,2',2"-NITRILOTRIS-

California Prop. 65

⚠ **WARNING**: This product can expose you to Diethanolamine, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Other regulations

Australia inventory (AICS) All components are listed or exempted.

Canada inventory All components are listed or exempted.

China inventory (IECSC) All components are listed or exempted.

Japan inventory (ENCS) All components are listed or exempted.

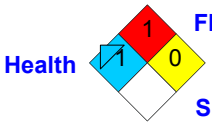
Korea inventory (KECI) All components are listed or exempted.

Section 15. Regulatory information

Philippines inventory (PICCS)	All components are listed or exempted.
Taiwan Chemical Substances Inventory (TCSI)	All components are listed or exempted.
REACH Status	For the REACH status of this product please consult your company contact, as identified in Section 1.

Section 16. Other information

National Fire Protection Association (U.S.A.)



History

Date of issue/Date of revision	06/27/2018.
Date of previous issue	01/11/2018.
Prepared by	Product Stewardship
Key to abbreviations	ACGIH = American Conference of Industrial Hygienists ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor CAS Number = Chemical Abstracts Service Registry Number GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) OEL = Occupational Exposure Limit SDS = Safety Data Sheet STEL = Short term exposure limit TWA = Time weighted average UN = United Nations UN Number = United Nations Number, a four digit number assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods. Varies = may contain one or more of the following 101316-69-2, 101316-70-5, 101316-71-6, 101316-72-7, 64741-88-4, 64741-89-5, 64741-95-3, 64741-96-4, 64741-97-5, 64742-01-4, 64742-44-5, 64742-45-6, 64742-52-5, 64742-53-6, 64742-54-7, 64742-55-8, 64742-56-9, 64742-57-0, 64742-58-1, 64742-62-7, 64742-63-8, 64742-64-9, 64742-65-0, 64742-70-7, 72623-85-9, 72623-86-0, 72623-87-1, 74869-22-0, 90669-74-2

Indicates information that has changed from previously issued version.

Notice to reader

All reasonably practicable steps have been taken to ensure this data sheet and the health, safety and environmental information contained in it is accurate as of the date specified below. No warranty or representation, express or implied is made as to the accuracy or completeness of the data and information in this data sheet.

The data and advice given apply when the product is sold for the stated application or applications. You should not use the product other than for the stated application or applications without seeking advice from BP Group.

It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. The BP Group shall not be responsible for any damage or injury resulting from use, other than the stated product use of the material, from any failure to adhere to recommendations, or from any hazards inherent in the nature of the material. Purchasers of the product for supply to a third party for use at work, have a duty to take all necessary steps to ensure that any person handling or using the product is provided with the information in this sheet. Employers have a duty to tell employees and others who may be affected of any hazards described in this sheet and of any precautions that should be taken. You can contact the BP Group to ensure that this document is the most current available. Alteration of this

Section 16. Other information

document is strictly prohibited.

SAFETY DATA SHEET

Section 1: Product and company identification

Product code WG102922

Product name INDUSTRIQ Primer SB 1K
W110
Zinc Dust Primer

Validation date 6. January 2018

Relevant identified uses of the substance or mixture and uses advised against

Material uses Synthetic resin based coating, used for industrial painting of metal and/or plastic material.

Supplier's details

Worwag Coatings LLC
3420 Kossuth ST
Lafayette, IN 47905
USA
Tel .: (765) 448-9681

Emergency telephone number (with hours of operation) Chemtrec 800-424-9300 (24h)

Section 2: Hazards identification

Classification of the substance or mixture

FLAMMABLE LIQUIDS - Category 3
SKIN SENSITIZATION - Category 1
CARCINOGENICITY - Category 2
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (hearing organs) - Category 2

GHS label elements

Hazard pictograms

Signal word Warning

Hazard statements

H226 - Flammable liquid and vapor.
H317 - May cause an allergic skin reaction.
H351 - Suspected of causing cancer.
H373 - May cause damage to organs through prolonged or repeated exposure. (hearing organs)

Precautionary statements

General Not applicable.

Section 2: Hazards identification

Prevention

P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P280 - Wear protective gloves. Wear eye or face protection. Wear protective clothing.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P241 - Use explosion-proof electrical, ventilating, lighting and all material-handling equipment.
P242 - Use only non-sparking tools.
P243 - Take precautionary measures against static discharge.
P233 - Keep container tightly closed.
P260 - Do not breathe vapor.
P272 (OSHA) - Contaminated work clothing must not be allowed out of the workplace.

Response

P314 - Get medical attention if you feel unwell.
P308 + P313 - IF exposed or concerned: Get medical attention.
P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.
P302 + P352 + P363 - IF ON SKIN: Wash with plenty of soap and water. Wash contaminated clothing before reuse.
P333 + P313 - If skin irritation or rash occurs: Get medical attention.

Storage

P405 - Store locked up.
P403 - Store in a well-ventilated place.
P235 - Keep cool.

Disposal

P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified

None known.

Section 3: Composition/information on ingredients

Substance/mixture Mixture

Ingredient name	%	CAS number
xylene	≤5	1330-20-7
zinc oxide	≤3	1314-13-2
Solvent naphtha (petroleum), light arom.	≤2.5	64742-95-6
Solvent naphtha (petroleum), light arom.	≤2.3	64742-95-6
n-Butyl acetate	≤3	123-86-4
Ethylbenzene	≤1.8	100-41-4
2-methoxy-1-methylethyl acetate	≤3	108-65-6
2-butanone oxime	≤0.3	96-29-7

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4: First aid measures

Description of necessary first aid measures

Eye contact	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Skin contact	Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Ingestion	Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact	No known significant effects or critical hazards.
Inhalation	No known significant effects or critical hazards.
Skin contact	May cause an allergic skin reaction.
Ingestion	No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact	No specific data.
Inhalation	No specific data.
Skin contact	Adverse symptoms may include the following: irritation redness
Ingestion	No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments	No specific treatment.
Protection of first-aiders	No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Section 4: First aid measures

See toxicological information (Section 11)

Section 5: Fire-fighting measures

Extinguishing media

Suitable extinguishing media	Use dry chemical, CO_2, water spray (fog) or foam.
Unsuitable extinguishing media	Do not use water jet.
Specific hazards arising from the chemical	Flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Runoff to sewer may create fire or explosion hazard.
Hazardous thermal decomposition products	Decomposition products may include the following materials: carbon dioxide carbon monoxide metal oxide/oxides
Special protective actions for fire-fighters	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
Special protective equipment for fire-fighters	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
For emergency responders	If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
Environmental precautions	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Section 6: Accidental release measures

Small spill

Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill

Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7: Handling and storage

Precautions for safe handling

Protective measures

Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene

Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Dry coat dust can be autoinflammable. Keep the paint wastes humides and work in water-trickeled cabins, to reduce the danger of autoinflammation.

Conditions for safe storage, including any incompatibilities

Store between the following temperatures: 15 to 25°C (59 to 77°F). Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8: Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
xylene	**ACGIH TLV (United States, 3/2016).** TWA: 100 ppm 8 hours. TWA: 434 mg/m³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 651 mg/m³ 15 minutes. **OSHA PEL 1989 (United States, 3/1989).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 655 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.
zinc oxide	**NIOSH REL (United States, 10/2013).** CEIL: 15 mg/m³ Form: Dust TWA: 5 mg/m³ 10 hours. Form: Dust and fumes STEL: 10 mg/m³ 15 minutes. Form: Fume **OSHA PEL 1989 (United States, 3/1989).** TWA: 5 mg/m³ 8 hours. Form: Fume STEL: 10 mg/m³ 15 minutes. Form: Fume TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 10 mg/m³ 8 hours. Form: Total dust **OSHA PEL (United States, 6/2016).** TWA: 5 mg/m³ 8 hours. Form: Fume TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 15 mg/m³ 8 hours. Form: Total dust **ACGIH TLV (United States, 3/2016).** TWA: 2 mg/m³ 8 hours. Form: Respirable fraction STEL: 10 mg/m³ 15 minutes. Form: Respirable fraction
Solvent naphtha (petroleum), light arom. Solvent naphtha (petroleum), light arom. n-Butyl acetate	None. None. **OSHA PEL 1989 (United States, 3/1989).** TWA: 150 ppm 8 hours. TWA: 710 mg/m³ 8 hours. STEL: 200 ppm 15 minutes. STEL: 950 mg/m³ 15 minutes. **NIOSH REL (United States, 10/2013).** TWA: 150 ppm 10 hours. TWA: 710 mg/m³ 10 hours. STEL: 200 ppm 15 minutes.

Section 8: Exposure controls/personal protection

	STEL: 950 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 150 ppm 8 hours. TWA: 710 mg/m³ 8 hours. **ACGIH TLV (United States, 3/2016).** STEL: 150 ppm 15 minutes. TWA: 50 ppm 8 hours.
Ethylbenzene	**ACGIH TLV (United States, 3/2016).** TWA: 20 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours. STEL: 125 ppm 15 minutes. STEL: 545 mg/m³ 15 minutes. **NIOSH REL (United States, 10/2013).** TWA: 100 ppm 10 hours. TWA: 435 mg/m³ 10 hours. STEL: 125 ppm 15 minutes. STEL: 545 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.
2-methoxy-1-methylethyl acetate	**AIHA WEEL (United States, 10/2011).** TWA: 50 ppm 8 hours.
2-butanone oxime	**AIHA WEEL (United States, 10/2011). Skin sensitizer.** TWA: 10 ppm 8 hours.

Appropriate engineering controls

Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls

Do not allow to enter drains or watercourses.

Individual protection measures

Hygiene measures

Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection

Use safety eyewear designed to protect against splash of liquids.

Skin protection

Hand protection

Barrier creams may help to protect the exposed areas of the skin but should not be applied once exposure has occurred.

Section 8: Exposure controls/personal protection

	The user must check that the final choice of type of glove selected for handling this product is the most appropriate and takes into account the particular conditions of use, as included in the user's risk assessment. The instructions and information provided by the glove manufacturer on use, storage, maintenance and replacement must be followed. Gloves should be replaced regularly and if there is any sign of damage to the glove material. Barrier creams may help to protect the exposed areas of the skin but should not be applied once exposure has occurred. breakthrough time: 6 - 8h Butyl rubber gloves. Thickness of the glove material: 0.5 mm Nitrile gloves. Thickness of the glove material: 0.7 mm
Body protection	Personnel should wear antistatic clothing made of natural fibers or of high-temperature-resistant synthetic fibers.
Other skin protection	Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Respiratory protection	organic vapor (Type A) and particulate filter (Type P1); Fresh-air tube device (DIN EN 138)

Section 9: Physical and chemical properties

Appearance	
Physical state	Liquid.
Color	Gray.
Odor	Not available.
Odor threshold	Not available.
Melting point/freezing point	Not available.
Initial boiling point and boiling range	>70°C (>158°F)
Flash point	Closed cup: 73.4°F (23°C)
Method	Abel-Pensky.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	Lower: 0.8%
Vapor pressure	Not available.
Vapor density	Not available.
Density	3.09 g/cm³
Method	DIN 53217
Solubility	Not available.
Solubility in water	Not available.
Partition coefficient: n-octanol/water	Not available.
Miscible in water.	No.
Auto-ignition temperature	Not available.

Section 9: Physical and chemical properties

Ignition temperature	> 200°C / > 390°F (solvent part)	
Decomposition temperature	Not available.	
Explosive properties	Not available.	
Oxidizing properties	Not available.	
Viscosity	45 to 55	sek 6 mm ISO 23°C
Solids content (by Weight)	87 %	

Aerosol product

No additional information.

Section 10: Stability and reactivity

Reactivity	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	The product is stable.
Possibility of hazardous reactions	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
Incompatible materials	Reactive or incompatible with the following materials: oxidizing materials
Hazardous decomposition products	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11: Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
xylene	LC50 Inhalation Gas.	Rat	5000 ppm	4 hours
	LD50 Oral	Rat	4300 mg/kg	-
n-Butyl acetate	LD50 Dermal	Rabbit	>17600 mg/kg	-
	LD50 Oral	Rat	10768 mg/kg	-
Ethylbenzene	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	3500 mg/kg	-
2-methoxy-1-methylethyl acetate	LD50 Dermal	Rabbit	>5 g/kg	-
	LD50 Oral	Rat	8532 mg/kg	-
2-butanone oxime	LD50 Oral	Rat	930 mg/kg	-

Irritation/Corrosion

Section 11: Toxicological information

Product/ingredient name	Result	Species	Score	Exposure	Observation
xylene	Eyes - Mild irritant	Rabbit	-	87 milligrams	-
	Eyes - Severe irritant	Rabbit	-	24 hours 5 milligrams	-
	Skin - Mild irritant	Rat	-	8 hours 60 microliters	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	100 Percent	-
zinc oxide	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
Solvent naphtha (petroleum), light arom.	Eyes - Mild irritant	Rabbit	-	24 hours 100 microliters	-
Solvent naphtha (petroleum), light arom.	Eyes - Mild irritant	Rabbit	-	24 hours 100 microliters	-
Ethylbenzene	Eyes - Severe irritant	Rabbit	-	500 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 milligrams	-
2-butanone oxime	Eyes - Severe irritant	Rabbit	-	100 microliters	-

Sensitization

Not available.

Mutagenicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Carcinogenicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Classification

Product/ingredient name	OSHA	IARC	NTP
xylene	-	3	-
Ethylbenzene	-	2B	-

Reproductive toxicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Teratogenicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Specific target organ toxicity (single exposure)

Section 11: Toxicological information

Name	Category	Route of exposure	Target organs
xylene	Category 3	Not applicable.	Respiratory tract irritation
Solvent naphtha (petroleum), light arom.	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Solvent naphtha (petroleum), light arom.	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
n-Butyl acetate	Category 3	Not applicable.	Narcotic effects

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
xylene	Category 2	Oral	Not determined
Ethylbenzene	Category 2	Not determined	hearing organs

Aspiration hazard

Name	Result
xylene	ASPIRATION HAZARD - Category 1
Solvent naphtha (petroleum), light arom.	ASPIRATION HAZARD - Category 1
Solvent naphtha (petroleum), light arom.	ASPIRATION HAZARD - Category 1
Ethylbenzene	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure Not available.

Potential acute health effects

Eye contact No known significant effects or critical hazards.

Inhalation No known significant effects or critical hazards.

Skin contact May cause an allergic skin reaction.

Ingestion No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact No specific data.

Inhalation No specific data.

Skin contact Adverse symptoms may include the following:
irritation
redness

Ingestion No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Section 11: Toxicological information

Potential immediate effects Not available.

Potential delayed effects Not available.

Long term exposure

Potential immediate effects Not available.

Potential delayed effects Not available.

Potential chronic health effects

Not available.

General May cause damage to organs through prolonged or repeated exposure. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity No known significant effects or critical hazards.

Teratogenicity No known significant effects or critical hazards.

Developmental effects No known significant effects or critical hazards.

Fertility effects No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	2980.8 mg/kg
Dermal	21905.2 mg/kg
Inhalation (gases)	139815 ppm
Inhalation (vapors)	869.3 mg/l

Section 12: Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
n-Butyl acetate	Acute LC50 32 mg/l Marine water	Crustaceans - Artemia salina	48 hours
	Acute LC50 18000 µg/l Fresh water	Fish - Pimephales promelas	96 hours
Ethylbenzene	Acute EC50 4600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 3600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Acute EC50 6530 µg/l Fresh water	Crustaceans - Artemia sp. - Nauplii	48 hours
	Acute EC50 2930 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 4200 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours

Section 12: Ecological information

2-methoxy-1-methylethyl acetate	EC50 >500 mg/l	Daphnia - Daphnia magna	48 hours
	LC50 161 mg/l	Fish - Pimephales promelas	96 hours
2-butanone oxime	Acute LC50 843000 µg/l Fresh water	Fish - Pimephales promelas	96 hours

Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Solvent naphtha (petroleum), light arom.	-	-	Readily

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
xylene	3.16	-	low
zinc oxide	-	60960	high
Solvent naphtha (petroleum), light arom.	-	10 to 2500	high
n-Butyl acetate	1.78	-	low
Ethylbenzene	3.15	15	low
2-methoxy-1-methylethyl acetate	0.56	-	low
2-butanone oxime	0.63	5.011872336	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) Not available.

Other adverse effects No known significant effects or critical hazards.

Section 13: Disposal considerations

Disposal methods The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 13: Disposal considerations

Waste disposal

The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Xylene	1330-20-7	Listed	U239

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

Section 14: Transport information

	DOT Classification	TDG Classification	Mexico Classification	ADR/RID	IMDG	IATA
UN number	UN1263	UN1263	UN1263	UN1263	UN1263	UN1263
UN proper shipping name	PAINT	PAINT	PAINT	PAINT	PAINT	PAINT
Transport hazard class(es)	3	3	3	3	3	3
Packing group	III	III	III	III	III	III

Date of issue/Date of revision	6. January 2018

Section 14: Transport information

Environmental hazards	No.	Yes.	Yes. The environmentally hazardous substance mark is not required.	Yes.	Yes.	Yes. The environmentally hazardous substance mark is not required.
Additional information	-	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2. 18-2.19 (Class 3), 2.7 (Marine pollutant mark). The marine pollutant mark is not required when transported by road or rail.	-	The environmentally hazardous substance mark is not required when transported in sizes of ≤5 L or ≤5 kg. **Special provisions** 640 (E) **Tunnel code** (D/E)	The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg.	The environmentally hazardous substance mark may appear if required by other transportation regulations.

Special precautions for user

Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code

Not available.

Section 15: Regulatory information

United States

U.S. Federal regulations

Clean Water Act (CWA) 307: Zinc; zinc oxide; Ethylbenzene; Benzene; Toluene; Benzene

Clean Water Act (CWA) 311: xylene; Ethylbenzene; Benzene; Toluene; n-Butyl acetate; Benzene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)

Listed

Date of issue/Date of revision	6. January 2018

Section 15: Regulatory information

Ingredient name	CAS number	Conc.	Conc. Lim. used	Qualifier	Ref. number	Rep. Quantity	Date
Xylenes	1330-20-7	3 - 5	Concentration limit established via list definition was used: ≥0				15/11/1990
Ethyl benzene	100-41-4	1 - 3	Concentration limit established via list definition was used: ≥0				15/11/1990
Benzene	71-43-2	0 - 0.1	Concentration limit established via list definition was used: ≥0				15/11/1990
Toluene	108-88-3	0 - 0.1	Concentration limit established via list definition was used: ≥0				15/11/1990
Benzene	71-43-2	0 - 0.1	Concentration limit established via list definition was used: ≥0				15/11/1990
Cumene	98-82-8	0 - 0.1	Concentration limit established via list definition was used: ≥0				15/11/1990
Cumene	98-82-8	0 - 0.1	Concentration limit established via list definition was used: ≥0				15/11/1990

Clean Air Act Section 183 (e) Control of emissions from certain sources (VOC) With volume exclusion [water excluded] 3.42 lbs/gal (409.8 g/l)

Clean Air Act Section 602 Class I Substances Not listed

Clean Air Act Section 602 Class II Substances Not listed

DEA List I Chemicals (Precursor Chemicals) Not listed

DEA List II Chemicals (Essential Chemicals) Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ Not applicable.

SARA 311/312

Classification Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Section 15: Regulatory information

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
xylene	≤5	Yes.	No.	No.	Yes.	Yes.
Solvent naphtha (petroleum), light arom.	≤2.5	Yes.	No.	No.	Yes.	No.
Solvent naphtha (petroleum), light arom.	≤2.3	Yes.	No.	No.	Yes.	No.
n-Butyl acetate	≤3	Yes.	No.	No.	Yes.	No.
Ethylbenzene	≤1.8	Yes.	No.	No.	Yes.	Yes.
2-methoxy-1-methylethyl acetate	≤3	Yes.	No.	No.	No.	No.
2-butanone oxime	≤0.3	No.	No.	No.	Yes.	Yes.

SARA 313

	Product name	CAS number	Concentration
Form R - Reporting requirements	Zinc xylene zinc oxide Ethylbenzene	7440-66-6 1330-20-7 1314-13-2 100-41-4	≥75 ≤5 ≤3 ≤1.8
Supplier notification	Zinc xylene zinc oxide Ethylbenzene	7440-66-6 1330-20-7 1314-13-2 100-41-4	≥75 ≤5 ≤3 ≤1.8

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations

Massachusetts The following components are listed: ZINC; ZINC OXIDE FUME; XYLENE; DIMETHYLBENZENE; ETHYL BENZENE; ETHYLBENZENE; BUTYL ACETATE; N-BUTYL ACETATE

New York The following components are listed: Zinc; Xylene mixed; Ethylbenzene; Butyl acetate

New Jersey The following components are listed: ZINC; ZINC OXIDE; XYLENES; BENZENE, DIMETHYL-; ETHYL BENZENE; BENZENE, ETHYL-; n-BUTYL ACETATE; ACETIC ACID, BUTYL ESTER

Pennsylvania The following components are listed: ZINC COMPOUNDS; ZINC OXIDE; ZINC OXIDE FUME; BENZENE, DIMETHYL-; BENZENE, ETHYL-; ACETIC ACID, BUTYL ESTER

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.
WARNING: This product contains less than 1% of a chemical known to the State of California to cause birth defects or other reproductive harm.

Section 15: Regulatory information

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
Ethylbenzene	Yes.	No.	41 µg/day (ingestion) 54 µg/day (inhalation)	No.
Cumene	Yes.	No.	No.	No.
Cumene	Yes.	No.	No.	No.
Toluene	No.	Yes.	No.	7000 µg/day (ingestion)
Benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)
Benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)
crystalline silica, non-respirable	Yes.	No.	No.	No.
Quartz (SiO2)	Yes.	No.	No.	No.

United States inventory (TSCA 8b) At least one component is not listed.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

International lists

National inventory

Australia At least one component is not listed.

Canada At least one component is not listed.

China At least one component is not listed.

Europe All components are listed or exempted.

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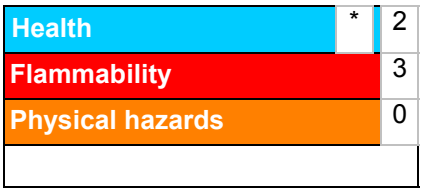
Section 15: Regulatory information

Japan	**Japan inventory (ENCS)**: At least one component is not listed. **Japan inventory (ISHL)**: Not determined.
Malaysia	Not determined.
New Zealand	Not determined.
Philippines	At least one component is not listed.
Republic of Korea	At least one component is not listed.
Taiwan	Not determined.
Turkey	Not determined.

Section 16: Other information

Label requirements FLAMMABLE LIQUID AND VAPOR. CAUSES EYE IRRITATION. MAY CAUSE SKIN IRRITATION. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. POSSIBLE CANCER HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE CANCER, BASED ON ANIMAL DATA.

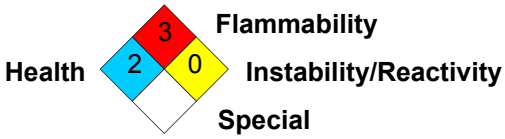
Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Date of issue/Date of revision	6. January 2018

Section 16: Other information

Classification	Justification
FLAMMABLE LIQUIDS - Category 3	On basis of test data
SKIN SENSITIZATION - Category 1	Calculation method
CARCINOGENICITY - Category 2	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (hearing organs) - Category 2	Calculation method

History

Date of issue	6. January 2018
Version	5
Print date	6. January 2018
CEPE code	1
Key to abbreviations	ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) UN = United Nations
References	Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Environmental Data Sheet

Certified Product Data Sheet

This document includes all information required by 40 CFR 63.801 (a) for a Certified Product Data Sheet

Product name	INMOTIQ Primer SB 1K W110 Zinc Dust Primer		
Product code	WG102922	**Product type**	W110
Color	Gray.		
Manufacturer	Worwag Coatings LLC 3420 Kossuth ST Lafayette, IN 47905		

Physical state	Liquid.		
Product Weight [lb/gal]	25.75 +/- 1.0 lb/gal	**Density**	3.09 g/cm³
Flash point	Closed cup: 73.4°F	**Solids content (by Weight)**	87 %

SARA 311/312	FLAMMABLE LIQUIDS - Category 3 SKIN SENSITIZATION - Category 1 CARCINOGENICITY - Category 2 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2

Regulated Ingredients

Chemical/Compound	CAS number	SARA 302 EPA [lbs.]	CERCLA RQ [lbs.]	SARA 313 TC	HAPS 112	[% by Weight]	[% by Volume]
Zinc	7440-66-6		1000 lbs / 454 kg	Yes	No	77.6	239.78
xylene	1330-20-7		100 lbs / 45.4 kg	Yes	Yes	3.89	13.98
zinc oxide	1314-13-2			Yes	No	2.4	1.31
1,2,4-trimethylbenzene	95-63-6			Yes	No	1.81	6.29
Ethylbenzene	100-41-4		1000 lbs / 454 kg	Yes	Yes	0.95	3.39
Cumene	98-82-8		5000 lbs / 2270 kg	Yes	Yes	0.06	0.21
toluene	108-88-3		1000 lbs / 454 kg	Yes	Yes	0.02	0.07
Benzene	71-43-2		10 lbs / 4.54 kg	Yes	Yes	0.01	0.04

Hazardous Air Pollutants (Clean Air Act, Section 112(b))

Volatile HAPS	**[lb/gal]**	0.41
Volatile HAPS	**[lb/gal] of solids**	5.24
Volatile HAPS	**(lb/lb) of solids**	0

VOC content

Total	With volume exclusion [water excluded]	3.42 lbs/gal (409.8 g/l)
	With volume exclusion [water not excluded]	3.42 lbs/gal (409.8 g/l)
[lb/gal] of solids	0	
(lb/lb) of solids	1	

Waste disposal

Waste disposal should be in accordance with applicable federal, state, and local laws. The appropriate method (s) of disposal depend(s) on the product composition at the time of disposal.

The environmental information contained in this product data sheet is based upon Worwag Coatings research and is believed to be reliable, but such information does not constitute a warranty either expressed or implied. As with any coatings material, care and required safety equipment should be utilized when using this product. Keep container tightly sealed and comply with all local safety regulations regarding its transportation, use and storage. The addition of reducers and/or other additives to this product may substantially alter the above data. Refer to the Safety Data Sheet for additional Health, Safety and Environmental information. (Method 24/calculation method was used for this EDS)

SAFETY DATA SHEET

Section 1: Product and company identification

Product code WT102682

Product name REDUCER

Validation date 20. September 2017

Relevant identified uses of the substance or mixture and uses advised against

Material uses Thinner for synthetic resin based coatings for industrial coating of metal and/or plastic material.

Supplier's details

Worwag Coatings LLC
3420 Kossuth ST
Lafayette, IN 47905
USA
Tel .: (765) 448-9681

Emergency telephone number (with hours of operation) Chemtrec 800-424-9300 (24h)

Section 2: Hazards identification

OSHA/HCS status This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

GHS Classification

Classification of the substance or mixture

SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 1
CARCINOGENICITY - Category 2
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (hearing organs) - Category 2
ASPIRATION HAZARD - Category 1

GHS label elements

Hazard pictograms

Signal word Danger

Section 2: Hazards identification

Hazard statements

H318 - Causes serious eye damage.
H315 - Causes skin irritation.
H351 - Suspected of causing cancer.
H304 - May be fatal if swallowed and enters airways.
H335 - May cause respiratory irritation.
H336 - May cause drowsiness and dizziness.
H373 - May cause damage to organs through prolonged or repeated exposure. (hearing organs)

Precautionary statements

General

Not applicable.

Prevention

P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P280 - Wear protective gloves. Wear eye or face protection. Wear protective clothing.
P271 - Use only outdoors or in a well-ventilated area.
P260 - Do not breathe vapor.
P264 - Wash hands thoroughly after handling.

Response

P314 - Get medical attention if you feel unwell.
P308 + P313 - IF exposed or concerned: Get medical attention.
P304 + P340 + P312 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell.
P301 + P310 + P331 - IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting.
P302 + P352 + P362+P364 - IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse.
P332 + P313 - If skin irritation occurs: Get medical attention.
P305 + P351 + P338 + P310 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician.

Storage

P405 - Store locked up.

Disposal

P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified

None known.

See toxicological information (Section 11)

Section 3: Composition/information on ingredients

Substance/mixture Mixture

Ingredient name	%	CAS number
n-Butyl acetate	≥50 - <75	123-86-4
Solvent naphtha (petroleum), light arom.	≥10 - <25	64742-95-6
1,2,4-trimethylbenzene	≥10 - <25	95-63-6
butan-1-ol	≥5 - <10	71-36-3
xylene	≥5 - <10	1330-20-7
Mesitylene	≥3 - <5	108-67-8
Ethylbenzene	≥3 - <5	100-41-4
Cumene	≥0.3 - <1	98-82-8

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

Section 3: Composition/information on ingredients

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4: First aid measures

Description of necessary first aid measures

Eye contact

Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.

Inhalation

Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact

Get medical attention immediately. Call a poison center or physician. Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion

Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact

Causes serious eye damage.

Inhalation

Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. May cause respiratory irritation.

Skin contact

Causes skin irritation.

Ingestion

Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.

Over-exposure signs/symptoms

Section 4: First aid measures

Eye contact	Adverse symptoms may include the following: pain watering redness
Inhalation	Adverse symptoms may include the following: respiratory tract irritation coughing nausea or vomiting headache drowsiness/fatigue dizziness/vertigo unconsciousness
Skin contact	Adverse symptoms may include the following: pain or irritation redness blistering may occur
Ingestion	Adverse symptoms may include the following: stomach pains nausea or vomiting

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments	No specific treatment.
Protection of first-aiders	No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5: Fire-fighting measures

Extinguishing media

Suitable extinguishing media	Use an extinguishing agent suitable for the surrounding fire.
Unsuitable extinguishing media	None known.
Specific hazards arising from the chemical	In a fire or if heated, a pressure increase will occur and the container may burst.
Hazardous thermal decomposition products	Decomposition products may include the following materials: carbon dioxide carbon monoxide

Section 5: Fire-fighting measures

Special protective actions for fire-fighters	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
Special protective equipment for fire-fighters	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
For emergency responders	If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
Environmental precautions	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill	Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
Large spill	Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7: Handling and storage

Precautions for safe handling

Protective measures	Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not swallow. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Section 7: Handling and storage

Advice on general occupational hygiene

Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Dry coat dust can be autoinflammable. Keep the paint wastes humides and work in water-trickeled cabins, to reduce the danger of autoinflammation.

Conditions for safe storage, including any incompatibilities

Store between the following temperatures: 5 to 30°C (41 to 86°F). Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8: Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
n-Butyl acetate	**OSHA PEL 1989 (United States, 3/1989).** TWA: 150 ppm 8 hours. TWA: 710 mg/m³ 8 hours. STEL: 200 ppm 15 minutes. STEL: 950 mg/m³ 15 minutes. **NIOSH REL (United States, 10/2013).** TWA: 150 ppm 10 hours. TWA: 710 mg/m³ 10 hours. STEL: 200 ppm 15 minutes. STEL: 950 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 150 ppm 8 hours. TWA: 710 mg/m³ 8 hours. **ACGIH TLV (United States, 3/2016).** STEL: 150 ppm 15 minutes. TWA: 50 ppm 8 hours.
Solvent naphtha (petroleum), light arom.	None.
1,2,4-trimethylbenzene	**ACGIH TLV (United States, 3/2016).** TWA: 25 ppm 8 hours. TWA: 123 mg/m³ 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 25 ppm 8 hours. TWA: 125 mg/m³ 8 hours. **NIOSH REL (United States, 10/2013).** TWA: 25 ppm 10 hours. TWA: 125 mg/m³ 10 hours.
butan-1-ol	**ACGIH TLV (United States, 3/2016).** TWA: 20 ppm 8 hours.

Section 8: Exposure controls/personal protection

xylene	**OSHA PEL 1989 (United States, 3/1989).** **Absorbed through skin.** CEIL: 50 ppm CEIL: 150 mg/m³ **NIOSH REL (United States, 10/2013).** **Absorbed through skin.** CEIL: 50 ppm CEIL: 150 mg/m³ **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 300 mg/m³ 8 hours. **ACGIH TLV (United States, 3/2016).** TWA: 100 ppm 8 hours. TWA: 434 mg/m³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 651 mg/m³ 15 minutes. **OSHA PEL 1989 (United States, 3/1989).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 655 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.
Mesitylene	**ACGIH TLV (United States, 3/2016).** TWA: 25 ppm 8 hours. TWA: 123 mg/m³ 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 25 ppm 8 hours. TWA: 125 mg/m³ 8 hours. **NIOSH REL (United States, 10/2013).** TWA: 25 ppm 10 hours. TWA: 125 mg/m³ 10 hours.
Ethylbenzene	**ACGIH TLV (United States, 3/2016).** TWA: 20 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours. STEL: 125 ppm 15 minutes. STEL: 545 mg/m³ 15 minutes. **NIOSH REL (United States, 10/2013).** TWA: 100 ppm 10 hours. TWA: 435 mg/m³ 10 hours. STEL: 125 ppm 15 minutes. STEL: 545 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.
Cumene	**OSHA PEL 1989 (United States, 3/1989).** **Absorbed through skin.** TWA: 50 ppm 8 hours.

Section 8: Exposure controls/personal protection

	TWA: 245 mg/m³ 8 hours. **NIOSH REL (United States, 10/2013).** **Absorbed through skin.** TWA: 50 ppm 10 hours. TWA: 245 mg/m³ 10 hours. **ACGIH TLV (United States, 3/2016).** TWA: 50 ppm 8 hours. **OSHA PEL (United States, 2/2013).** **Absorbed through skin.** TWA: 50 ppm 8 hours. TWA: 245 mg/m³ 8 hours.

Appropriate engineering controls Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Consult local authorities for acceptable exposure limits.

Individual protection measures

Hygiene measures Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/ or face shield. If inhalation hazards exist, a full-face respirator may be required instead.

Skin protection

Hand protection Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Section 8: Exposure controls/personal protection

Respiratory protection	Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9: Physical and chemical properties

Appearance

Physical state	Liquid.
Color	Colorless.
Odor	Not available.
Odor threshold	Not available.
Melting point	Not available.
Boiling point	>70°C (>158°F)
Flash point	Closed cup: 212°F (100°C)
Method	Abel-Pensky.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	Lower: 0.8%
Ignition temperature	> 200°C / > 390°F (solvent part)
Vapor pressure	Not available.
Vapor density	Not available.
Density	0.87 g/cm³
Method	DIN 53217
Solubility	Not available.
Miscible in water.	No.
Partition coefficient: n-octanol/water	Not available.
Solids content (by Weight)	0 %
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.

Section 10: Stability and reactivity

Reactivity	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	The product is stable.
Possibility of hazardous reactions	Under normal conditions of storage and use, hazardous reactions will not occur.

Section 10: Stability and reactivity

Conditions to avoid No specific data.

Incompatible materials No specific data.

Hazardous decomposition products Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11: Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
n-Butyl acetate	LD50 Dermal	Rabbit	>17600 mg/kg	-
	LD50 Oral	Rat	10768 mg/kg	-
1,2,4-trimethylbenzene	LC50 Inhalation Vapor	Rat	18000 mg/m³	4 hours
	LD50 Oral	Rat	5 g/kg	-
butan-1-ol	LC50 Inhalation Vapor	Rat	24000 mg/m³	4 hours
	LD50 Dermal	Rabbit	3400 mg/kg	-
	LD50 Oral	Rat	790 mg/kg	-
xylene	LC50 Inhalation Gas.	Rat	5000 ppm	4 hours
	LD50 Oral	Rat	4300 mg/kg	-
Mesitylene	LC50 Inhalation Vapor	Rat	24000 mg/m³	4 hours
	LD50 Oral	Rat	5000 mg/kg	-
Ethylbenzene	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	3500 mg/kg	-
Cumene	LC50 Inhalation Vapor	Rat	39000 mg/m³	4 hours
	LD50 Oral	Rat	1400 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Solvent naphtha (petroleum), light arom.	Eyes - Mild irritant	Rabbit	-	24 hours 100 microliters	-
butan-1-ol	Eyes - Severe irritant	Rabbit	-	24 hours 2 milligrams	-
	Eyes - Severe irritant	Rabbit	-	0.005 Mililiters	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-
xylene	Eyes - Mild irritant	Rabbit	-	87 milligrams	-
	Eyes - Severe irritant	Rabbit	-	24 hours 5 milligrams	-
	Skin - Mild irritant	Rat	-	8 hours 60 microliters	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	100 Percent	-
Mesitylene	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-

Section 11: Toxicological information

Ethylbenzene	Eyes - Severe irritant	Rabbit	-	500 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 milligrams	-
Cumene	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Eyes - Mild irritant	Rabbit	-	86 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 10 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 100 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Carcinogenicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Classification

Product/ingredient name	OSHA	IARC	NTP
xylene	-	3	-
Ethylbenzene	-	2B	-
Cumene	-	2B	Reasonably anticipated to be a human carcinogen.

Reproductive toxicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Teratogenicity

Not available.

Conclusion/Summary No known significant effects or critical hazards.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
n-Butyl acetate	Category 3	Not applicable.	Narcotic effects
Solvent naphtha (petroleum), light arom.	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
1,2,4-trimethylbenzene	Category 3	Not applicable.	Respiratory tract irritation
butan-1-ol	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects

Section 11: Toxicological information

xylene	Category 3	Not applicable.	Respiratory tract irritation
Mesitylene	Category 3	Not applicable.	Respiratory tract irritation
Cumene	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
xylene	Category 2	Oral	Not determined
Ethylbenzene	Category 2	Not determined	hearing organs

Aspiration hazard

Name	Result
Solvent naphtha (petroleum), light arom.	ASPIRATION HAZARD - Category 1
1,2,4-trimethylbenzene	ASPIRATION HAZARD - Category 1
xylene	ASPIRATION HAZARD - Category 1
Ethylbenzene	ASPIRATION HAZARD - Category 1
Cumene	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure Not available.

Potential acute health effects

Eye contact Causes serious eye damage.

Inhalation Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. May cause respiratory irritation.

Skin contact Causes skin irritation.

Ingestion Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact Adverse symptoms may include the following:
pain
watering
redness

Inhalation Adverse symptoms may include the following:
respiratory tract irritation
coughing
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness

Section 11: Toxicological information

Skin contact	Adverse symptoms may include the following: pain or irritation redness blistering may occur
Ingestion	Adverse symptoms may include the following: stomach pains nausea or vomiting

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects	Not available.
Potential delayed effects	Not available.

Long term exposure

Potential immediate effects	Not available.
Potential delayed effects	Not available.

Potential chronic health effects

Not available.

General	May cause damage to organs through prolonged or repeated exposure.
Carcinogenicity	Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.
Mutagenicity	No known significant effects or critical hazards.
Teratogenicity	No known significant effects or critical hazards.
Developmental effects	No known significant effects or critical hazards.
Fertility effects	No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	4931.7 mg/kg
Dermal	6917.2 mg/kg
Inhalation (gases)	90930.1 ppm
Inhalation (vapors)	114.5 mg/l

Section 12: Ecological information

Ecotoxicity No known significant effects or critical hazards.

Toxicity

Product/ingredient name	Result	Species	Exposure
n-Butyl acetate	Acute LC50 32 mg/l Marine water	Crustaceans - Artemia salina	48 hours
	Acute LC50 18000 µg/l Fresh water	Fish - Pimephales promelas	96 hours
Ethylbenzene	Acute EC50 4600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 3600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Acute EC50 6530 µg/l Fresh water	Crustaceans - Artemia sp. - Nauplii	48 hours
	Acute EC50 2930 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 4200 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours
Cumene	Acute EC50 2600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 7400 µg/l Fresh water	Crustaceans - Artemia sp. - Nauplii	48 hours
	Acute EC50 10600 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 2700 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours

Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
butan-1-ol	-	-	Readily

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
n-Butyl acetate	1.78	-	low
1,2,4-trimethylbenzene	3.63	-	low
butan-1-ol	0.88	-	low
xylene	3.16	-	low
Mesitylene	3.42	-	low
Ethylbenzene	3.15	15	low
Cumene	3.66	94.69	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) Not available.

Other adverse effects No known significant effects or critical hazards.

Section 13: Disposal considerations

Disposal methods

The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

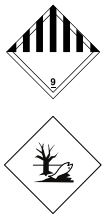
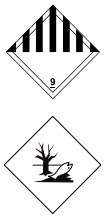
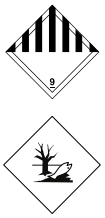
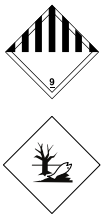
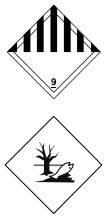
United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Xylene	1330-20-7	Listed	U239
1-Butanol (I); n-Butyl alcohol (I)	71-36-3	Listed	U031

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

Section 14: Transport information

	DOT Classification	TDG Classification	Mexico Classification	ADR/RID	IMDG	IATA
UN number	UN3082	UN3082	UN3082	UN3082	UN3082	UN3082
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (xylene, n-Butyl acetate)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Solvent naphtha (petroleum), light arom., 1,2, 4-trimethylbenzene)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Solvent naphtha (petroleum), light arom., 1,2, 4-trimethylbenzene)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Solvent naphtha (petroleum), light arom., 1,2, 4-trimethylbenzene)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Solvent naphtha (petroleum), light arom., 1,2, 4-trimethylbenzene)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Solvent naphtha (petroleum), light arom., 1,2, 4-trimethylbenzene)
Transport hazard class(es)	9	9 	9 	9 	9 	9 
Packing group	III	III	III	III	III	III

Date of issue/Date of revision	20. September 2017

Section 14: Transport information

Environmental hazards	No.	Yes.	Yes.	Yes.	Yes.	Yes.
Additional information	**Reportable quantity** 1818.6 lbs / 825.65 kg [250.7 gal / 949.02 L] The classification of the product is due solely to the presence of one or more US DOT-listed 'Hazardous substances' that are subject to reportable quantity requirements and only applies to shipments of packages greater than, or equal to, the product reportable quantity. Package sizes less than the product reportable quantity are not regulated as hazardous materials.	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.43-2.45 (Class 9), 2.7 (Marine pollutant mark). Non-bulk packages of this product are not regulated as dangerous goods when transported by road or rail.	The environmentally hazardous substance mark is not required when transported in sizes of ≤5 L or ≤5 kg.	This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8. **Tunnel code** (E)	This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.	This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 5.0.2.4.1, 5.0.2.6.1.1 and 5.0.2.8.

Special precautions for user

Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code

Not available.

Section 15: Regulatory information

U.S. Federal regulations

Clean Water Act (CWA) 307: Benzene; Ethylbenzene; Benzene

Clean Water Act (CWA) 311: n-Butyl acetate; xylene; Benzene; Ethylbenzene; Benzene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) Listed

Ingredient name	CAS number	Conc.	Conc. Lim. used	Qualifier	Ref. number	Rep. Quantity	Date
Xylenes	1330-20-7	5 - 10	Concentration limit established via list definition was used: ≥1				15/11/1990
Ethyl benzene	100-41-4	3 - 5	Concentration limit established via list definition was used: ≥1				15/11/1990

Clean Air Act Section 183 (e) Control of emissions from certain sources (VOC) With volume exclusion [water excluded] 7.26 lbs/gal (870 g/l)

Clean Air Act Section 602 Class I Substances Not listed

Clean Air Act Section 602 Class II Substances Not listed

DEA List I Chemicals (Precursor Chemicals) Not listed

DEA List II Chemicals (Essential Chemicals) Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ Not applicable.

SARA 311/312

Classification Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard

Section 15: Regulatory information

n-Butyl acetate	≥50 - <75	Yes.	No.	No.	Yes.	No.
Solvent naphtha (petroleum), light arom.	≥10 - <25	Yes.	No.	No.	Yes.	No.
1,2,4-trimethylbenzene	≥10 - <25	Yes.	No.	No.	Yes.	No.
butan-1-ol	≥5 - <10	Yes.	No.	No.	Yes.	No.
xylene	≥5 - <10	Yes.	No.	No.	Yes.	Yes.
Mesitylene	≥3 - <5	Yes.	No.	No.	Yes.	No.
Ethylbenzene	≥3 - <5	Yes.	No.	No.	Yes.	Yes.
Cumene	≥0.3 - <1	Yes.	No.	No.	Yes.	Yes.

SARA 313

	Product name	CAS number	Concentration
Form R - Reporting requirements	1,2,4-trimethylbenzene butan-1-ol xylene Ethylbenzene	95-63-6 71-36-3 1330-20-7 100-41-4	≥10 - <25 ≥5 - <10 ≥5 - <10 ≥3 - <5
Supplier notification	1,2,4-trimethylbenzene butan-1-ol xylene Ethylbenzene	95-63-6 71-36-3 1330-20-7 100-41-4	≥10 - <25 ≥5 - <10 ≥5 - <10 ≥3 - <5

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations

Massachusetts The following components are listed: BUTYL ACETATE; N-BUTYL ACETATE; PSEUDOCUMENE; XYLENE; DIMETHYLBENZENE; MESITYLENE; 1,3,5 TRIMETHYL BENZENE; ETHYL BENZENE; ETHYLBENZENE; N-BUTYL ALCOHOL; 1-BUTANOL

New York The following components are listed: Butyl acetate; Cumene; Benzene, 1-methylethyl-; Xylene mixed; Ethylbenzene; Butyl alcohol; 1-Butanol

New Jersey The following components are listed: n-BUTYL ACETATE; ACETIC ACID, BUTYL ESTER; PSEUDOCUMENE; 1,2,4-TRIMETHYL BENZENE; CUMENE; BENZENE, (1-METHYLETHYL)-; XYLENES; BENZENE, DIMETHYL-; TRIMETHYL BENZENE (mixed isomers); BENZENE, TRIMETHYL-; ETHYL BENZENE; BENZENE, ETHYL-; n-BUTYL ALCOHOL; 1-BUTANOL

Pennsylvania The following components are listed: ACETIC ACID, BUTYL ESTER; PSEUDOCUMENE; BENZENE, (1-METHYLETHYL)-; BENZENE, DIMETHYL-; BENZENE, ETHYL-; 1-BUTANOL

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.
WARNING: This product contains less than 1% of a chemical known to the State of California to cause birth defects or other reproductive harm.

Section 15: Regulatory information

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
Ethylbenzene	Yes.	No.	41 µg/day (ingestion) 54 µg/day (inhalation)	No.
Cumene	Yes.	No.	No.	No.
Benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)
Benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)

United States inventory (TSCA 8b) All components are listed or exempted.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Inform Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

International lists

National inventory

Australia All components are listed or exempted.
Canada All components are listed or exempted.
China All components are listed or exempted.
Europe All components are listed or exempted.
Japan All components are listed or exempted.
Malaysia Not determined.
New Zealand All components are listed or exempted.
Philippines All components are listed or exempted.
Republic of Korea All components are listed or exempted.
Taiwan All components are listed or exempted.

Section 16: Other information

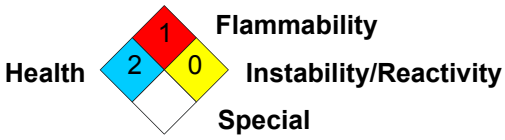
Hazardous Material Information System (U.S.A.)

Health	*	2
Flammability		1
Physical hazards		0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
Skin Irrit. 2, H315	Calculation method
Eye Dam. 1, H318	Calculation method
Carc. 2, H351	Calculation method
STOT SE 3, H335	Calculation method
STOT SE 3, H336	Calculation method
STOT RE 2, H373 (hearing organs)	Calculation method
Asp. Tox. 1, H304	Calculation method

History

Date of issue	20. September 2017
Version	3
Print date	20. September 2017

Section 16: Other information

Key to abbreviations	ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) UN = United Nations
References	Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Technical Data Sheet

Product Name: Wörwag – Reducing Solvent Blend for WG102922
Worwag Code: WT102682 Technology Code:

Color name:	Color code:

Performance Properties	:	Solvent blend for WG102922
Storage information	:	Shelf life 24 months stored @ 50-85° F
Chemical characterization	:	Blend of organic solvents

Physical Properties as supplied		
Viscosity	:	
Density	:	0.87 +/- 0.05 g/ml
Wt./Gallon	:	7.26 +/- 0.2 lbs/gal
PH	:	
Weight / Volume solid	:	
VOC	:	7.26 +/- 0.2 lbs/gal
HAPs by wt	:	

Physical Properties as applied	
Activator	:
Activator Ratio	:
Reducer / Ratio	:
Applied Viscosity	:
Pot life	:

Application Properties	
Stir instruction	:
Film thickness (dry film)	:
Theoretical Coverage	:
Substrate	:
Pretreatment	:
Application method	:
Spray application	:
gun nozzle	:
pressure	:
Flash off	:
Curing schedule	:
Gloss	:

The technical information contained in this product data sheet and suggestions with reference to its application is based upon Worwag Coatings research and are believed to be reliable, but such information do not constitute a warranty either expressed or implied. As with any coatings material care and required safety equipment should be utilized when using this product. Avoid any contact with skin or eyes. Adequate ventilation should be provided. Keep away from heat, sparks or flames. Keep container tightly sealed and comply with all local safety regulations regarding its transportation, use and storage. Refer to Material Safety Data Sheet (MSDS) for additional Health, Safety and Environmental information.

1 IDENTIFICATION

Product Name:	**GEOMET® 360**
Product Code(s):	GMT1196
Manufacturer:	NOF Metal Coatings North America Inc. 275 Industrial Parkway, Chardon, Ohio 44024 Office: 440-285-2231 Fax: 440-285-5009
Emergency Phone:	CHEMTREC: +1 703-741-5970 / 1-800-424-9300

2 HAZARDS IDENTIFICATION

Signal Word: **DANGER**

HAZARD CLASSIFICATION

Germ Cell Mutagenicity	Category 1B
Toxic to Reproduction	Category 1B
Specific Target Organ Toxicity (SE)	Category 2
Eye Damage/ Irritation	Category 2A

HAZARD STATEMENTS

H319	Causes serious eye irritation.
H340	May cause genetic defects.
H360	May damage fertility or the unborn child.
H371	May cause damage to organs.

PRECAUTIONARY STATEMENTS

PREVENTION

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe fumes, mist, vapors or spray.
P264	Wash hands thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P280	Wear protective gloves and eye/face protection.

RESPONSE

P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313	IF exposed or concerned: Get medical attention.
P337+P313	If eye irritation persists: Get medical attention.

STORAGE

P405	Store locked up.

DISPOSAL

P501	Dispose of contents and container in accordance with all applicable regulations.

3 COMPOSITION / INFORMATION ON INGREDIENTS

Product is a mixture of the substances listed below with nonhazardous additions.

COMPONENT	CAS NUMBER	WEIGHT %
Zinc Powder (stabilized)	7440-66-6	20 – 30
Aluminum Powder (stabilized)	7429-90-5	6 – 11
Methanol	67-56-1	< 4
Distillates (petroleum), hydrotreated light	64742-47-8	< 2
Naphtha (petroleum), hydrotreated heavy	64742-48-9	< 2
Boric Acid	10043-35-3	< 1
Solvent naphtha (petroleum), light aromatic	64742-95-6	< 1

Any concentration shown as a range is to protect product confidentiality or is due to batch variation.

In accordance with paragraph (i) of §1910.1200, specific chemical identities and exact concentration of composition of this product have been withheld as a trade secret.

4 FIRST-AID MEASURES

Eyes:	Flush immediately with plenty of clean, lukewarm water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Skin:	Generally, this product does not irritate the skin.
Inhalation:	If overcome by exposure, remove victim to fresh air immediately. Consult doctor if irritation occurs.
Ingestion:	Do not induce vomiting. If affected person is fully conscious, wash out mouth with water and give 2-3 glasses of water to drink. Consult doctor if irritation occurs.

5 FIRE-FIGHTING MEASURES

Suitable Extinguishing Media:	Extinguishing powder, CO_2, water spray or alcohol resistant foam.
Unsuitable Extinguishing Media:	No further relevant information available.
Special Procedures:	No special measures required.
Hazardous Combustion Products:	No further relevant information available.

6 ACCIDENTAL RELEASE MEASURES

Precautions:	Use appropriate protective equipment. Keep unprotected persons away.
Environmental:	Do not allow to enter sewers/ surface or ground water.
Containment:	Absorb with liquid-binding material (sand, dolomite, universal binders, or sawdust). Use neutralizing agent. Ensure adequate ventilation. Do not flush with water or aqueous agents.
Waste Disposal:	Dispose of collected material in compliance with local, state and federal regulations.

7 HANDLING AND STORAGE

Storage:	Store in a cool, dry, well-ventilated area. Avoid exposure to excessive heat for long periods of time. Avoid direct sunlight.
Handling:	Ensure good ventilation/ exhaustion at the workplace. Open and handle receptacle with care. Prevent formation of aerosols.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS

COMPONENT	TYPE	VALUE
Methanol (CAS# 67-56-1)	OSHA PEL NIOSH REL ACGIH TLV	TWA: 260 mg/m^3 (200 ppm) TWA: 260 mg/m^3 (200 ppm) ST: 325 mg/m^3 (250 ppm) TWA: 262 mg/m^3 (200 ppm) ST: 328 mg/m^3 (250 ppm)
Boric Acid (CAS# 10043-35-3)	ACGIH TLV	TWA: 3 mg/m^3 ST: 6 mg/m^3

EXPOSURE CONTROLS

Ventilation & Engineering Measures:	Use ventilation if possible, e.g., fans or exhaust systems, to keep vapor levels below recommended exposure limits.
Respiratory Protection:	If adequate ventilation is not available, wear a NIOSH-approved respirator for protection against fumes, vapors, mists and spray.
Eye Protection:	Wear safety goggles or safety glasses with unperforated side shields and a face shield.
Skin Protection:	Wear chemical resistant gloves and long sleeves to minimize skin exposure. Contaminated clothing, including shoes, should be stored separately, and cleaned before reusing.
Other:	Do not eat or drink in area where product is used. Wash hands after handling.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Metallic grey liquid.
Odor:	N/D
Odor Threshold:	N/D
Boiling Point:	100°C (212°F)
Melting Point/Freezing point:	N/A
Vapor Pressure (mm of Hg @ 20˚C):	N/D
Vapor Density (AIR=1):	N/D
Relative Density:	N/D
Specific Gravity (Water=1):	1.3 – 1.4
pH:	6 – 9
Solubility in Water:	N/A
Evaporation Rate (n-Butyl Acetate=1):	Equal to water.
Viscosity:	N/D
Partition Coefficient (n-octanol/water):	N/D
Decomposition Temperature:	N/D
Flashpoint:	101°F (PMCC) (Does NOT sustain combustion per ASTM 4206)
Auto-ignition Temperature:	N/A
Flammability Limits	
UFL (% by volume):	N/A
LFL (% by volume):	N/A

10 STABILITY AND REACTIVITY

Chemical Stability:	Stable under normal conditions.
Conditions to Avoid:	Isolate from extreme heat and cold.
Incompatible Materials:	No further relevant information available.
Hazardous Decomposition Products:	No dangerous decomposition products known.
Hazardous Polymerization:	Will not occur under normal conditions.

11 TOXICOLOGICAL INFORMATION

Routes of Exposure: Eye/Skin contact, inhalation and ingestion.

ACUTE HEALTH HAZARDS

Eyes:	Exposure to eyes will cause serious irritation.
Skin:	No irritant effect.
Inhalation:	Prolonged exposure can cause inheritable damage.

INFORMATION ON TOXICOLOGICAL EFFECTS

Serious Eye Damage/Irritation:	Causes serious eye damage.
Respiratory/Skin Sensitization:	No sensitizing effects known.
Germ Cell Mutagenicity:	May cause genetic defects.
Reproductive Toxicity:	May damage fertility or the unborn child.
Specific Organ Toxicity:	May cause damage to organs.

COMPONENT ACUTE TOXICOLOGICAL INFORMATION

COMPONENT	TEST	SPECIES	RESULT
Methanol (CAS# 67-56-1)	Oral LD_{50} Dermal LD_{50}	Rat Rabbit	5628 mg/kg 15800 mg/kg
Nonylphenol, Ethoxylated (CAS# 9016-45-9)	Oral LD_{50} Dermal LD_{50} Inhalative LC_{50}/4 h	Rat Rabbit Rat	>4290 mg/kg 2500 mg/kg >21.3 mg/l
Boric Acid (CAS# 10043-35-3)	Oral LD_{50}	Rat	2660 mg/kg
Naphtha (petroleum), hydrotreated heavy (CAS# 64742-48-9)	Oral LD_{50} Dermal LD_{50}	Rat Rabbit	>5000 mg/kg >3000 mg/kg
Solvent Naphtha, light aromatic (CAS# 64742-95-6)	Oral LD_{50} Dermal LD_{50} Inhalative LC_{50}/4 h	Rat Rabbit Rat	>6800 mg/kg >3400 mg/kg >10.2 mg/l

Information is based on data from components or similar materials.

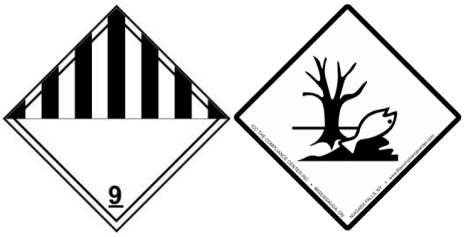
12 ECOLOGICAL INFORMATION

Ecological effects of this product mixture have not been tested.

13 DISPOSAL CONSIDERATIONS

Waste Disposal:	Dispose of in accordance with federal, state, and local regulations. The generation of waste should be avoided or minimized whenever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Do not flush to drain/storm sewer.
Packaging Disposal:	Empty containers should be taken to a licensed waste handling site for recycling or disposal, since emptied containers may contain product residue. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Follow all label warnings even after containers are emptied.

14 TRANSPORT INFORMATION

UN Number:	UN3082
Shipping Name:	
DOT:	Not Regulated.
IMDG:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (ZINC, ETHOXYLATED NONYLPHENOL), MARINE POLLUTANT
IATA:	Environmentally hazardous substance, liquid, n.o.s. (Zinc, Ethoxylated Nonylphenol)
Packing Group:	III
Hazard Class:	9 Miscellaneous dangerous substances and articles.
IMDG/ IATA Label:	

15 REGULATORY INFORMATION

US REGULATORY INFORMATION

SARA § 313 Reportable Ingredients:	Methanol (CAS# 67-56-1)
SARA § 302 EHS TPQ:	None.
SARA § 304 EHS RQ:	None.
CERCLA RQ:	Zinc (CAS# 7440-66-6): 1000 lbs. Methanol (CAS# 67-56-1): 5000 lbs.
TSCA 8(b):	All of the components of this product are listed on the TSCA Inventory.
Clean Water Act:	None.
Clean Air Act:	None.

NFPA:

HMIS:

HEALTH	1
FLAMMABILITY	2
REACTIVITY	0
PERSONAL PROTECTION	D

16 OTHER INFORMATION

SDS Date:	04/12/2016
Revision Date:	08/24/2017

This Safety Data Sheet was prepared in accordance with 29 CFR 1910.1200. All information, recommendations and suggestions appearing herein concerning our product are based on tests and data believed to be reliable; however, it is the users' responsibility to determine the safety, toxicity and suitability for his own use of the product described herein. Since the actual use by others is beyond our control, no guarantee expressed or implied is made by NOF Metal Coatings North America Inc. as to the effects of such use, the results to be obtained, or the safety and toxicity of the product, nor does NOF Metal Coatings North America Inc. assume any liability arising out of use by others of the product referred to herein. Nor is the information herein to be construed as absolutely complete, since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations.

NOF METAL COATINGS NORTH AMERICA

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AIR QUALITY DATA SHEET

The data given below is for the composition of the product as formulated. Variations may occur on individual batches because of adjustments made during production.

PRODUCT: GEOMET® 360

Product Codes: GMT1196

GEOMET® 360	Value	Unit	Method
Volume % NVM	17.6	%	ASTM D2697
Weight % HAP	3.4	%	Calculated
Density	11.05	lbs/gal	ASTM D1475
VOC + Exempt	1.6	lbs/gal	EPA 24
VOC - Exempt	4.0	lbs/gal	EPA 24

HAP Content	CAS	Wt %
Methanol	67-56-1	3.4

Please Note: This information is provided for the sole purpose of assisting you in complying with reporting requirements and should not be used or distributed for any other purpose.

BRO:09022015

Water

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 11/15/2013 Revision date: 06/12/2018 Supersedes: 01/25/2017 Version: 1.3

SECTION 1: Identification

1.1. Identification

Product form : Substance

Substance name : Water

CAS-No. : 7732-18-5

Product code : LC26750

Formula : H2O

1.2. Recommended use and restrictions on use

Use of the substance/mixture : For laboratory and manufacturing use only.

Recommended use : Laboratory chemicals

Restrictions on use : Not for food, drug or household use

1.3. Supplier

LabChem Inc
Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court
Zelienople, PA 16063 - USA
T 412-826-5230 - F 724-473-0647
info@labchem.com - www.labchem.com

1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or +1-703-741-5970

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS-US classification

Not classified

2.2. GHS Label elements, including precautionary statements

Not classified as a hazardous chemical.

Other hazards not contributing to the classification : None.

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substances

Substance type : Mono-constituent

Name	Product identifier	%	GHS-US classification
Water (Main constituent)	(CAS-No.) 7732-18-5	100	Not classified

Full text of hazard classes and H-statements : see section 16

3.2. Mixtures

Not applicable

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures general : If you feel unwell, seek medical advice (show the label where possible).

First-aid measures after inhalation : Allow victim to breathe fresh air. Allow the victim to rest. Adverse effects not expected from this product.

First-aid measures after skin contact : Adverse effects not expected from this product. Take off contaminated clothing.

First-aid measures after eye contact : Adverse effects not expected from this product.

First-aid measures after ingestion : Do NOT induce vomiting. Adverse effects not expected from this product.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects : Not expected to present a significant hazard under anticipated conditions of normal use.

4.3. Immediate medical attention and special treatment, if necessary

Treat symptomatically.

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand.

5.2. Specific hazards arising from the chemical

No additional information available

5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire.

Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Emergency procedures : Evacuate unnecessary personnel.

6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Ventilate area.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Keep container closed when not in use.

Incompatible products : Metallic sodium.

Incompatible materials : Sources of ignition. Direct sunlight.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

No additional information available

8.2. Appropriate engineering controls

Appropriate engineering controls : Provide adequate general and local exhaust ventilation.

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment:

Gloves. Safety glasses.

Hand protection:

Wear protective gloves.

Eye protection:

Chemical goggles or safety glasses

Respiratory protection:

None necessary.

Other information:

Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Liquid
Color	:	Colorless
Odor	:	None.
Odor threshold	:	No data available
pH	:	7
Melting point	:	0 °C
Freezing point	:	No data available
Boiling point	:	100 °C
Critical temperature	:	374.1 °C
Critical pressure	:	218.3 atm
Flash point	:	No data available
Relative evaporation rate (butyl acetate=1)	:	No data available
Flammability (solid, gas)	:	Non flammable.
Vapor pressure	:	17.535 mm Hg
Vapor pressure at 50 °C	:	92.51 mm Hg
Relative vapor density at 20 °C	:	No data available
Relative density	:	1
Specific gravity / density	:	0.99823 g/ml
Molecular mass	:	18 g/mol
Solubility	:	Soluble in acetic acid. Soluble in acetone. Soluble in ammonia. Soluble in ammonium chloride. Soluble in ethanol. Soluble in glycerol. Soluble in hydrochloric acid. Soluble in methanol. Soluble in nitric acid. Soluble in sulfuric acid. Soluble in sodium hydroxide solution. Soluble in propylene glycol.
Log Pow	:	No data available
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity, kinematic	:	1.004 cSt
Viscosity, dynamic	:	1.002 cP
Explosion limits	:	No data available
Explosive properties	:	Not applicable.
Oxidizing properties	:	None.

9.2. Other information

VOC content : 0 %

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Not established.

10.4. Conditions to avoid

Extremely high or low temperatures.

10.5. Incompatible materials

Metallic sodium.

10.6. Hazardous decomposition products

Hydrogen. oxygen.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Likely routes of exposure : Skin and eye contact

Acute toxicity : Not classified

Water (7732-18-5)	
LD50 oral rat	≥ 90000 mg/kg
ATE US (oral)	90000 mg/kg body weight

Skin corrosion/irritation : Not classified
pH: 7

Serious eye damage/irritation : Not classified
pH: 7

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified
(Based on available data, the classification criteria are not met)

Reproductive toxicity : Not classified

Specific target organ toxicity – single exposure : Not classified

Specific target organ toxicity – repeated exposure : Not classified

Aspiration hazard : Not classified

Potential Adverse human health effects and symptoms : Based on available data, the classification criteria are not met.

SECTION 12: Ecological information

12.1. Toxicity

No additional information available

12.2. Persistence and degradability

Water (7732-18-5)	
Persistence and degradability	Not established.

12.3. Bioaccumulative potential

Water (7732-18-5)	
Bioaccumulative potential	Not established.

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Other information : No other effects known.

SECTION 13: Disposal considerations

13.1. Disposal methods

Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Not regulated

SECTION 15: Regulatory information

15.1. US Federal regulations

Water (7732-18-5)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

15.2. International regulations

CANADA

No additional information available

EU-Regulations

No additional information available

National regulations

No additional information available

15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

SECTION 16: Other information

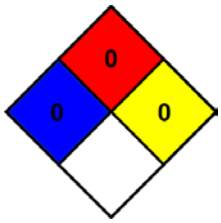
Revision date : 06/12/2018

Other information : None.

NFPA health hazard : 0 - Materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials.

NFPA fire hazard : 0 - Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.

NFPA reactivity : 0 - Material that in themselves are normally stable, even under fire conditions.



Hazard Rating

Health : 0 Minimal Hazard - No significant risk to health

Flammability : 0 Minimal Hazard - Materials that will not burn

Physical : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

Personal protection : A

A - Safety glasses

SDS US LabChem

Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.

SAFETY DATA SHEET

CITGO No. 2 Diesel Fuel, Low Sulfur, All Grades

Section 1. Identification

GHS product identifier : CITGO No. 2 Diesel Fuel, Low Sulfur, All Grades

Chemical name : Fuels, diesel, No 2

Synonyms : No. 2-D Grade Diesel Fuel Oil (defined by ASTM D-975); Treated or Refined Diesel Fuel No. 2; Grade 2 Distillate Fuel; Hydrodesulfurized Middle Distillate; C9-C16 Petroleum Hydrocarbons

Code : Various

MSDS # : AG2DF

Supplier's details : CITGO Petroleum Corporation
P.O. Box 4689
Houston, TX 77210
sdsvend@citgo.com

Emergency telephone number : Technical Contact: (832) 486-4000
Medical Emergency: (832) 486-4700
CHEMTREC Emergency: (800) 424-9300
(United States Only)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 3
ACUTE TOXICITY: INHALATION - Category 4
SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2B
CARCINOGENICITY - Category 2
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) [central nervous system (CNS)] - Category 2
ASPIRATION HAZARD - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Flammable liquid and vapor.
Harmful if inhaled.
Causes skin and eye irritation.
Suspected of causing cancer.
May be fatal if swallowed and enters airways.
May cause damage to organs through prolonged or repeated exposure. (central nervous system (CNS))

Precautionary statements

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Do not breathe vapor. Wash hands thoroughly after handling.

Section 2. Hazards identification

Response : Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. If skin irritation occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up. Store in a well-ventilated place. Keep cool.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : Fuels, diesel, No 2

Other means of identification : No. 2-D Grade Diesel Fuel Oil (defined by ASTM D-975); Treated or Refined Diesel Fuel No. 2; Grade 2 Distillate Fuel; Hydrodesulfurized Middle Distillate; C9-C16 Petroleum Hydrocarbons

CAS number/other identifiers

CAS number : 68476-34-6

Ingredient name	%	CAS number
Ethyltoluene	<3	25550-14-5
Trimethylbenzene, all isomers	<2	25551-13-7
Naphthalene	<2	91-20-3
Biphenyl	<2	92-52-4
Cumene	<1	98-82-8
Xylenes, mixed isomers	<1	1330-20-7
Ethylbenzene	<1	100-41-4

* = Various ** = Mixture *** = Proprietary

Any concentration shown as a range is to protect confidentiality or is due to process variation.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that gas or vapor is still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Wash contaminated skin with soap and water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Section 4. First aid measures

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute

Potential acute health effects

Eye contact : Causes eye irritation.

Inhalation : Harmful if inhaled. Long-term exposure to diesel engine exhaust may cause cancer.

Skin contact : Causes skin irritation.

Ingestion : May be fatal if swallowed and enters airways. Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : Adverse symptoms may include the following:
nausea or vomiting

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : If ingested, this material presents a significant aspiration and chemical pneumonitis hazard. Induction of emesis is not recommended. Consider activated charcoal and/or gastric lavage. If patient is obtunded, protect the airway by cuffed endotracheal intubation or by placement of the body in a Trendelenburg and left lateral decubitus position.

Specific treatments : Treat symptomatically and supportively.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that gas or vapor is still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Specific hazards arising from the chemical : Flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Extinguishing media

Suitable extinguishing media : Use dry chemical, carbon dioxide (CO_2,) water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

Section 5. Fire-fighting measures

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
Diesel engine exhaust

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not swallow. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container. Non equilibrium conditions may increase the fire hazard associated with this product. Always bond receiving containers to the fill pipe before and during loading. Always confirm that receiving container is properly grounded. Bonding and grounding alone

Section 7. Handling and storage

may be inadequate to eliminate fire and explosion hazards. Carefully review operations that may increase the risks such as tank and container filling, tank cleaning, sampling, gauging, loading, filtering, mixing, agitation, etc. In addition to bonding and grounding, efforts to mitigate the hazards may include, but are not limited to, ventilation, inerting and/or reduction of transfer velocities.
Always keep nozzle in contact with the container throughout the loading process. Do NOT fill any portable container in or on a vehicle.

Special precautions, such as reduced loading rates and increased monitoring, must be observed during "switch loading" operations (i.e., loading this material in tanks or shipping compartments that previously contained a dissimilar product).

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Bulk Storage Conditions: Maintain all storage tanks in accordance with applicable regulations. Use necessary controls to monitor tank inventories. Inspect all storage tanks on a periodic basis. Test tanks and associated piping for tightness. Maintain the automatic leak detection devices to assure proper working condition.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Trimethylbenzene, all isomers	**ACGIH TLV (United States, 4/2014).** TWA: 25 ppm 8 hours. TWA: 123 mg/m³ 8 hours.
Naphthalene	**ACGIH (United States). Absorbed through skin.** TWA: 10 ppm 8 hours. STEL: 15 ppm 15 minutes. **OSHA (United States).** TWA: 10 ppm 8 hours. **ACGIH TLV (United States, 4/2014). Absorbed through skin.** TWA: 10 ppm 8 hours. TWA: 52 mg/m³ 8 hours. **OSHA PEL (United States, 2/2013).** TWA: 10 ppm 8 hours. TWA: 50 mg/m³ 8 hours.
Biphenyl	**OSHA PEL Z2 (United States).** TWA: 0.2 ppm 8 hours. **ACGIH TLV (United States, 4/2014).** TWA: 0.2 ppm 8 hours. TWA: 1.3 mg/m³ 8 hours. **OSHA PEL (United States, 2/2013).** TWA: 0.2 ppm 8 hours. TWA: 1 mg/m³ 8 hours.
Cumene	**ACGIH TLV (United States, 4/2014).** TWA: 50 ppm 8 hours. **OSHA PEL (United States, 2/2013). Absorbed through**

Section 8. Exposure controls/personal protection

	skin. TWA: 50 ppm 8 hours. TWA: 245 mg/m³ 8 hours.
Xylenes, mixed isomers	**ACGIH TLV (United States, 4/2014).** TWA: 100 ppm 8 hours. TWA: 434 mg/m³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 651 mg/m³ 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.
Ethylbenzene	**ACGIH TLV (United States, 4/2014).** TWA: 20 ppm 8 hours. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm 8 hours. TWA: 435 mg/m³ 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, vapor controls, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: Splash goggles. Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. chemical splash goggles. If inhalation hazards exist, a full-face respirator may be required instead.

Skin protection

Hand protection : Chemical-resistant gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or supplied-air respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Physical state	:	Liquid.
Color	:	Colorless to light yellow or red.
Odor	:	Characteristic.
pH	:	Not available.
Melting point	:	-30 to -18°C (-22 to -0.4°F)
Boiling point/boiling range	:	282 to 338°C (539.6 to 640.4°F)
Flash point	:	Closed cup: 52°C (125.6°F) [Pensky-Martens.]
Evaporation rate	:	<1 (butyl acetate = 1)
Lower and upper explosive (flammable) limits	:	Lower: 0.6% Upper: 6.5%
Vapor pressure	:	0.27 kPa (2 mm Hg) [room temperature]
Vapor density	:	5 [Air = 1]
Relative density	:	0.84
Density lbs/gal	:	Estimated 7 lbs/gal
Gravity, °API	:	Estimated 37 @ 60 F
Solubility	:	Very slightly soluble in the following materials: cold water.
Solubility in water	:	0.005 g/l
Partition coefficient: n-octanol/water	:	>3.3
Auto-ignition temperature	:	254 to 285°C (489.2 to 545°F)
Viscosity	:	Kinematic (room temperature): 0.03 cm^2/s (3 cSt)

Section 10. Stability and reactivity

Reactivity	:	Not expected to be Explosive, Self-Reactive, Self-Heating, or an Organic Peroxide under US GHS Definition(s).
Chemical stability	:	The product is stable.
Possibility of hazardous reactions	:	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	:	Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.
Incompatible materials	:	Reactive or incompatible with the following materials: oxidizing materials
Hazardous decomposition products	:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Section 11. Toxicological information

Product/ingredient name	Result	Species	Dose	Exposure
Trimethylbenzene, all isomers	LD50 Oral	Rat	8970 mg/kg	-
Naphthalene	LD50 Oral	Rat	490 mg/kg	-
Biphenyl	LD50 Dermal	Rabbit	>5010 mg/kg	-
	LD50 Oral	Rat	2140 mg/kg	-
Cumene	LC50 Inhalation Vapor	Mouse	10 g/m³	7 hours
	LD50 Dermal	Rabbit	12300 uL/kg	-
	LD50 Oral	Rat	2.9 g/kg	-
	LD50 Oral	Rat	4000 mg/kg	-
Xylenes, mixed isomers	LC50 Inhalation Gas.	Cat	9500 ppm	2 hours
	LC50 Inhalation Gas.	Rat	5000 ppm	4 hours
	LC50 Inhalation Gas.	Rat	6700 ppm	4 hours
	LC50 Inhalation Gas.	Rat	6670 ppm	4 hours
	LD50 Oral	Mouse	2119 mg/kg	-
	LD50 Oral	Rat	4300 mg/kg	-
	LD50 Oral	Rat	4300 mg/kg	-
Ethylbenzene	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	3500 mg/kg	-

Conclusion/Summary : No additional information.

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Trimethylbenzene, all isomers	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 milligrams	-
Naphthalene	Skin - Mild irritant	Rabbit	-	495 milligrams	-
Biphenyl	Eyes - Mild irritant	Rabbit	-	100 milligrams	-
	Skin - Severe irritant	Rabbit	-	24 hours 500 microliters	-
Cumene	Eyes - Mild irritant	Rabbit	-	86 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 10 milligrams	-
Xylenes, mixed isomers	Skin - Mild irritant	Rat	-	8 hours 60 microliters	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	100 Percent	-
Ethylbenzene	Skin - Mild irritant	Rabbit	-	24 hours 15 milligrams	-

Skin : No additional information.

Eyes : No additional information.

Respiratory : No additional information.

Sensitization

Skin : No additional information.

Respiratory : No additional information.

Mutagenicity

Conclusion/Summary : No additional information.

Carcinogenicity

Conclusion/Summary :

Section 11. Toxicological information

Diesel exhaust particulate: Lung tumor and lymphomas were identified in rats and mice exposed to unflitered diesel fuel exhaust in chronic inhalation studies. Further, epidemiological studies have identified increase incidences of lung cancer in US railroad workers and bladder cancer in bus and truck drivers possibly associated with exposure to diesel engine exhaust. NTP has determined that exposure to diesel exhaust particulates, a complex mixture of combustion products of diesel fuel, is reasonably anticipated to be a human carcinogen. In addition, NIOSH has identified complete diesel exhaust as a potential carcinogen.

Classification

Product/ingredient name	OSHA	IARC	NTP
Fuels, diesel, No 2	-	3	-
Diesel exhaust particulate	-	1	Reasonably anticipated to be a human carcinogen.
Naphthalene	-	2B	Reasonably anticipated to be a human carcinogen.
Cumene	-	2B	Reasonably anticipated to be a human carcinogen.
Xylenes, mixed isomers	-	3	-
Ethylbenzene	-	2B	-

Reproductive toxicity

Conclusion/Summary : No additional information.

Teratogenicity

Conclusion/Summary : No additional information.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Trimethylbenzene, all isomers	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Biphenyl	Category 3	Not applicable.	Respiratory tract irritation
Cumene	Category 3	Not applicable.	Respiratory tract irritation
Ethylbenzene	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Fuels, diesel, No 2	Category 2	Not determined	central nervous system (CNS)
Trimethylbenzene, all isomers	Category 2	Not determined	central nervous system (CNS)
Xylenes, mixed isomers	Category 2	Not determined	ears

Aspiration hazard

Name	Result
Trimethylbenzene, all isomers	ASPIRATION HAZARD - Category 1
Cumene	ASPIRATION HAZARD - Category 1
Ethylbenzene	ASPIRATION HAZARD - Category 1
propylbenzene	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Routes of entry anticipated: Dermal, Inhalation.

Potential acute health effects

Eye contact : Causes eye irritation.

Inhalation : Harmful if inhaled. Long-term exposure to diesel engine exhaust may cause cancer.

Skin contact : Causes skin irritation.

Section 11. Toxicological information

Ingestion : May be fatal if swallowed and enters airways. Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : Adverse symptoms may include the following:
nausea or vomiting

Potential chronic health effects

General : May cause damage to organs through prolonged or repeated exposure.

Carcinogenicity : Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Trimethylbenzene, all isomers	Acute LC50 5600 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
Naphthalene	Acute EC50 1600 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 2350 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 213 µg/l Fresh water	Fish - Melanotaenia fluviatilis - Larvae	96 hours
	Chronic NOEC 0.67 ppm Fresh water	Fish - Oncorhynchus kisutch	40 days
Biphenyl	Acute LC50 360 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 1450 µg/l Fresh water	Fish - Pimephales promelas	96 hours
	Chronic NOEC 0.17 mg/l Fresh water	Daphnia - Daphnia magna - Neonate	21 days
	Chronic NOEC 0.229 mg/l Fresh water	Fish - Oncorhynchus mykiss	87 days
Cumene	Acute EC50 2600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 7400 µg/l Fresh water	Crustaceans - Artemia sp. - Nauplii	48 hours
	Acute EC50 10600 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 2700 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours
Xylenes, mixed isomers	Acute EC50 90 mg/l Fresh water	Crustaceans - Cypris subglobosa	48 hours
	Acute LC50 8.5 ppm Marine water	Crustaceans - Palaemonetes pugio - Adult	48 hours
	Acute LC50 8500 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 15700 µg/l Fresh water	Fish - Lepomis macrochirus -	96 hours

Section 12. Ecological information

		Juvenile (Fledgling, Hatchling, Weanling)	
	Acute LC50 19000 µg/l Fresh water	Fish - Lepomis macrochirus	96 hours
	Acute LC50 13400 µg/l Fresh water	Fish - Pimephales promelas	96 hours
	Acute LC50 16940 µg/l Fresh water	Fish - Carassius auratus	96 hours
Ethylbenzene	Acute EC50 4600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 3600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Acute EC50 2930 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 5200 µg/l Marine water	Crustaceans - Americamysis bahia	48 hours
	Acute LC50 4200 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours
	Chronic NOEC 1000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours

Conclusion/Summary : Not available.

Persistence and degradability

Not available.

Conclusion/Summary : Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Fuels, diesel, No 2	>3.3	-	low
Trimethylbenzene, all isomers	3.4 to 3.8	-	low
Naphthalene	3.4	36.5 to 168	low
Biphenyl	4.008	1900	high
Cumene	3.55	94.69	low
Xylenes, mixed isomers	3.12	8.1 to 25.9	low
Ethylbenzene	3.6	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

RCRA classification : D001, D018

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	NA1993	UN 1202	UN 1202
UN proper shipping name	NA 1993, Diesel Fuel, 3, PG III	UN 1202, Diesel Fuel, 3, PG III	UN 1202, Diesel Fuel, 3, PG III
Transport hazard class(es)	3	3	3
Packing group	III	III	III
Environmental hazards	No.	Yes.	No.
Additional information	**Packaging instruction** **Passenger aircraft** Quantity limitation: 60 L Packaging instructions: Y309 **Cargo aircraft** Quantity limitation: 220 L Packaging instructions: 310 **Remarks** 49 CFR 173.150 (f)(1) states that a flammable liquid with a flash point at or above 38ºC (100ºF) that does not meet the definition of any other hazard class may be reclassed as a combustible liquid. This provision does not apply to transportation by vessel or aircraft except where other means of transportaion is impracticable.	-	**Cargo Aircraft Only**Quantity limitation: 220 L Packaging instructions: 310 **Limited Quantities - Passenger Aircraft**Quantity limitation: 60 L Packaging instructions: 309Y

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 15. Regulatory information

U.S. Federal regulations : **United States inventory (TSCA 8b)**: All components are listed or exempted.

Clean Water Act (CWA) 307: Ethylbenzene; Naphthalene; Toluene; Benzene

Clean Water Act (CWA) 311: Ethylbenzene; Xylenes, mixed isomers; Naphthalene; Toluene; Benzene

This material is classified as an oil under Section 311 of the Clean Water Act (CWA) and the Oil Pollution Act of 1990 (OPA). Discharges or spills which produce a visible sheen on waters of the United States, their adjoining shorelines, or into conduits leading to surface waters must be reported to the EPA's National Response Center at (800) 424-8802.

Section 15. Regulatory information

SARA 302/304

Composition/information on ingredients

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Name	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Fuels, diesel, No 2	Yes.	No.	No.	Yes.	Yes.
Trimethylbenzene, all isomers	Yes.	No.	No.	Yes.	Yes.
Naphthalene	Yes.	No.	No.	Yes.	Yes.
Biphenyl	No.	No.	No.	Yes.	No.
Cumene	Yes.	No.	No.	Yes.	Yes.
Xylenes, mixed isomers	Yes.	No.	No.	Yes.	Yes.
Ethylbenzene	Yes.	No.	No.	Yes.	Yes.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	Naphthalene Ethylbenzene	91-20-3 100-41-4	<1 <1
Supplier notification	Naphthalene Ethylbenzene	91-20-3 100-41-4	<1 <1

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed: Trimethylbenzene, all isomers; Ethyltoluene

New York : The following components are listed: Ethylbenzene; Cumene; Benzene, 1-methylethyl-; Naphthalene

New Jersey : The following components are listed: Ethylbenzene; Cumene; NAPHTHALENE; TRIMETHYL BENZENE (mixed isomers); BENZENE, TRIMETHYL-; ETHYLTOLUENES; BENZENE, ETHYLMETHYL-

Pennsylvania : The following components are listed: Ethylbenzene; Cumene; NAPHTHALENE; Trimethylbenzene, all isomers; Ethyltoluene

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.
WARNING: This product contains less than 1% of a chemical known to the State of California to cause birth defects or other reproductive harm.

Ingredient name	%	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
Naphthalene	<1	Yes.	No.	Yes.	No.
Cumene	<1	Yes.	No.	No.	No.
Ethylbenzene	<1	Yes.	No.	41 µg/day (ingestion) 54 µg/day (inhalation)	No.
Diesel exhaust particulate	<1	Yes.	No.	No.	No.
Toluene	<0.1	No.	Yes.	No.	7000 µg/day (ingestion)
Benzene	<0.1	Yes.	Yes.	6.4 µg/day (ingestion)	24 µg/day (ingestion) 49 µg/day

Section 15. Regulatory information

				13 µg/day (inhalation)	(inhalation)

International regulations

International lists : **Australia inventory (AICS)**: All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Japan inventory: All components are listed or exempted.
Korea inventory: All components are listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.
Philippines inventory (PICCS): All components are listed or exempted.
Taiwan inventory (CSNN): Not determined.

Canada inventory : All components are listed or exempted.

EU Inventory : All components are listed or exempted.

WHMIS (Canada) : Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-2A: Material causing other toxic effects (Very toxic).

Section 16. Other information

National Fire Protection Association (U.S.A.)

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of issue/Date of revision : 7/29/2015.

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Notice to reader

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Appendix H
CU01/ST02 - CO Control Option Supporting Data

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	19	125,000	323	28.01

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV),

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	160,000	scfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is a default pressure drop for catalytic oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	650	$/ft³	* $650/cubic foot is a default value for a base metal catalyst. User should enter actual value, if known.
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Enter the cost data:

Desired dollar-year	2025			
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	390.6	1999 CEPCI
Annual Interest Rate (i)	5.50	%		
Electricity ($Cost_{elect}$)	0.08061	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$24.00	per hour		
Maintenance Labor rate	$33.00	per hour		
Contingency Factor (CF)	15.0	Percent		

*Enter dollar year first.

* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G4Sinterest rate.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Catalyst Cost ($/ft³)	650	Based on 2014 vendor data for base metal oxide catalyst.		Check with catalyst vendor.
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	19	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	19	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair}) =	(For catalytic oxidizers)	0.248	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_j$) =	19	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_j) \times LEL_j))]^{-1}$ =	125,000	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.02	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	160,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	717.6	kW		
Q_{wo}	≈ Q_{wi} =	160,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	657	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the oxidizer (T_{fo})	= T_{fi} - T_{wo} + T_{wi} =	333	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum(-\Delta h_{ci})\ x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.01	Btu/scf	0.1	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.21 in Chapter 2 of the Cost Manual)	1,097.65	scfm		
Auxiliary fuel Energy Input =		962,946	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	124,923	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)		Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		1,098	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	161,098	scfm		
Calculation of Catalyst Volume and Estimated Temperature of Waste Gas Entering the Catalyst Bed					
Volumetric Flow Rate at 60 °F and 1 atm (Q_{fi})	= $Q_{tot} \times (519)/(77\ °F + 460)$ =	155,698	scfm		
Catalyst Volume (Vol_{cat})	= Q_{fi}/Φ	311.40	ft^3		
Estimated inlet temperature to the catalyst bed (T_{fi}) =	(Calculated using Equation 2.28 in Chapter 2 of the Cost Manual)	900	°F		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\ (1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Future Worth Factor

Parameter	Equation	Calculated Value
Future Worth Factor (FWF) =	$i\ [1/(1+i)^y - 1]$ =	0.2303
	Where y = Catalyst Life and i= Interest Rate	

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2025 CEPI/1999 CEPCI) =	$2,207,995	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$220,799	
Sales taxes =	0.03 × A =	$66,240	
Freight =	0.05 × A =	$110,400	
	Total Purchased equipment costs (B) =	$2,605,434	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$208,435	
Handling and Erection =	0.14 × B =	$364,761	
Electrical =	0.04 × B =	$104,217	
Piping =	0.02 × B =	$52,109	
Insulation for Ductwork =	0.01 × B =	$26,054	
Painting =	0.01 × B =	$26,054	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$781,630	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$3,387,064	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$260,543	
Construction and field expenses =	0.05 × B =	$130,272	
Contractor fees =	0.10 × B =	$260,543	
Start-up =	0.02 × B =	$52,109	
Performance test =	0.01 × B =	$26,054	
	Total Indirect Costs (IC) =	$729,522	
Continency Cost (C) =	CF(IC+DC)=	$617,488	
Total Capital Investment =	**DC + IC +C =**	**$4,734,074**	**in 2025 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/$ft^3$ cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$50,342	
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$506,729	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$3,519,234	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$4,127,551**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$94,681	
Property Taxes	= 1% of TCI	$47,341	
Insurance	= 1% of TCI	$47,341	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$391,594	
Indirect Annual Costs (IC) =		**$611,705**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$4,739,256**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$4,739,256	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	57.9	tons/year
Cost Effectiveness =	$81,804	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	19	125,000	323	28.01

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	160,000	scfm	
Pressure drop (ΔP)	19	inches of water	* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2025			
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	536.4	2016 CEPCI
Annual Interest Rate (i)	5.50	%		
Electricity ($Cost_{elect}$)	0.08061	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$24.00	per hour		
Maintenance Labor rate	$33.00	per hour		
Contingency Factor (CF)	15.0	Percent		

*Enter dollar year first.

* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G4Sinterest rate.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	19	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	19	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair})	(For thermal oxidizers)	0.255	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	19	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	125,000	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.02	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	160,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	592.8	kW		
Q_{wo}	= Q_{wi} =	160,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	1,900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	1,357	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the regenerative oxidizer (T_{fo})	= T_{fi} - 0.95(T_{fi} - T_{wi}) =	181	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum (-\Delta h_{ci}) x_i$ Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.01	Btu/scf	0.1	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.45 in Appendix B)	313.84	scfm		
Auxiliary fuel Energy Input =		275,328	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	267,808	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion?	(Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)	Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		314	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	160,314	scfm		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i(1+i)^n/(1+i)^n - 1$ = Where n = Equipment Life and i= Interest Rate	0.0837

Cost Estimate

Direct Costs

Total Purchased equipment costs (in 2025 dollars)

Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=(2.204 x 100,000 + 11.57 Qtot) x (2025 CEPI/1999 CEPCI) =	$3,700,608	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$370,061	
Sales taxes =	0.03 × A =	$111,018	
Freight =	0.05 × A =	$185,030	
	Total Purchased equipment costs (B) =	$4,366,718	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)

Foundations and Supports =	0.08 × B =	$349,337	
Handling and Erection =	0.14 × B =	$611,340	
Electrical =	0.04 × B =	$174,669	
Piping =	0.02 × B =	$87,334	
Insulation for Ductwork =	0.01 × B =	$43,667	
Painting =	0.01 × B =	$43,667	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$1,310,015	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$5,676,733	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)

Engineering =	0.10 × B =	$436,672	
Construction and field expenses =	0.05 × B =	$218,336	
Contractor fees =	0.10 × B =	$436,672	
Start-up =	0.02 × B =	$87,334	
Performance test =	0.01 × B =	$43,667	
	Total Indirect Costs (IC) =	$1,222,681	
Continency Cost (C) =	CF(IC+DC)=	$1,034,912	
Total Capital Investment =	**DC + IC +C =**	**$7,934,326**	**in 2025 dollars**

Direct Annual Costs

Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$418,602	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$1,006,227	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$1,476,075**	**in 2025 dollars**

Indirect Annual Costs

Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$158,687	
Property Taxes	= 1% of TCI	$79,343	
Insurance	= 1% of TCI	$79,343	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$663,939	
Indirect Annual Costs (IC) =		**$1,012,060**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$2,488,135**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$2,488,135	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	57.9	tons/year
Cost Effectiveness =	$42,947	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	19	125,000	323	28.01
VOC	2	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{ss}) at 77°F and 1 atm.	160,000	scfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is a default pressure drop for catalytic oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{ti})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	650	$/ft³	* $650/cubic foot is a default value for a base metal catalyst. User should enter actual value, if known.
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	390.6	1999 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G45interest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49
Footnotes			
* Greenhouse gas.			
** Hazardous air pollutant.			

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Catalyst Cost ($/ft³)	650	Based on 2014 vendor data for base metal oxide catalyst.		Check with catalyst vendor.
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	19	NA
VOC	2	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	21	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair}) =	(For catalytic oxidizers)	0.248	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= $(\sum x_j)$ =	21	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_j) \times LEL_j))]^{-1}$ =	86,572	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.02	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/$(\sum x_i)$ =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	160,000	scfm		
Oxygen Content of gas stream	= 100 - $(\sum x_j \times 100/10^6)$ =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	717.6	kW		
Q_{wo}	= Q_{wi} =	160,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	657	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the oxidizer (T_{fo})	= T_{fi} - T_{wo} + T_{wi} =	333	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum(-\Delta h_{ci})\, x_i$				
	Where $(-\Delta h_{ci})$ is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.01	Btu/scf	0.1	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.21 in Chapter 2 of the Cost Manual)	1,096.82	scfm		
Auxiliary fuel Energy Input =		962,220	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × ρ_{fi} × Q_{fi} × C_{pmfi} × (T_{fi} - T_{ref}) =	124,923	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)		Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		1,097	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af} =	161,097	scfm		
Calculation of Catalyst Volume and Estimated Temperature of Waste Gas Entering the Catalyst Bed					
Volumetric Flow Rate at 60 °F and 1 atm (Q_{fi})	= Q_{tot} × (519)/(77 °F + 460) =	155,697	scfm		
Catalyst Volume (Vol_{cat})	= Q_{fi}/Φ	311.39	ft^3		
Estimated inlet temperature to the catalyst bed (T_{fi}) =	(Calculated using Equation 2.28 in Chapter 2 of the Cost Manual)	899	°F		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\,(1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Future Worth Factor

Parameter	Equation	Calculated Value
Future Worth Factor (FWF) =	$i\,[1/(1+i)^y - 1]$ =	0.2303
	Where y = Catalyst Life and i= Interest Rate	

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2025 CEPI/1999 CEPCI) =	$2,207,989	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$220,799	
Sales taxes =	0.03 × A =	$66,240	
Freight =	0.05 × A =	$110,399	
	Total Purchased equipment costs (B) =	$2,605,427	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$208,434	
Handling and Erection =	0.14 × B =	$364,760	
Electrical =	0.04 × B =	$104,217	
Piping =	0.02 × B =	$52,109	
Insulation for Ductwork =	0.01 × B =	$26,054	
Painting =	0.01 × B =	$26,054	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$781,628	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$3,387,055	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$260,543	
Construction and field expenses =	0.05 × B =	$130,271	
Contractor fees =	0.10 × B =	$260,543	
Start-up =	0.02 × B =	$52,109	
Performance test =	0.01 × B =	$26,054	
	Total Indirect Costs (IC) =	$729,519	
Continency Cost (C) =	CF(IC+DC)=	$617,486	
Total Capital Investment =	**DC + IC +C =**	**$4,734,060**	**in 2025 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/$ft^3$ cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$50,342	
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$506,729	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$3,516,579	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$4,124,895**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$94,681	
Property Taxes	= 1% of TCI	$47,341	
Insurance	= 1% of TCI	$47,341	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$391,593	
Indirect Annual Costs (IC) =		**$611,703**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$4,736,599**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$4,736,599	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	66.9	tons/year
Cost Effectiveness =	$70,788	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	19	125,000	323	28.01
VOC	2	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	160,000	scfm	
Pressure drop (ΔP)	19	inches of water	* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2025			
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	536.4	2016 CEPCI
Annual Interest Rate (i)	5.50	%		
Electricity ($Cost_{elect}$)	0.08061	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$24.00	per hour		
Maintenance Labor rate	$33.00	per hour		
Contingency Factor (CF)	15.0	Percent		

*Enter dollar year first.

* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G45interest rate.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	19	NA
VOC	2	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	21	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair})	(For thermal oxidizers)	0.255	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	21	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	86,572	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.02	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	160,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	592.8	kW		
Q_{wo}	= Q_{wi} =	160,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	1,900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	1,357	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the regenerative oxidizer (T_{fo})	= T_{fi} - 0.95(T_{fi} - T_{wi}) =	181	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum (-\Delta h_{ci})\ x_i$ Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.01	Btu/scf	0.1	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.45 in Appendix B)	313.02	scfm		
Auxiliary fuel Energy Input =		274,608	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	267,807	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion?	(Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)	Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		313	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	160,313	scfm		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\ (1+i)^n/(1+i)^n - 1$ = Where n = Equipment Life and i= Interest Rate	0.0837

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=(2.204 x 100,000 + 11.57 Qtot) x (2025 CEPI/1999 CEPCI) =	$3,700,591	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$370,059	
Sales taxes =	0.03 × A =	$111,018	
Freight =	0.05 × A =	$185,030	
	Total Purchased equipment costs (B) =	$4,366,698	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$349,336	
Handling and Erection =	0.14 × B =	$611,338	
Electrical =	0.04 × B =	$174,668	
Piping =	0.02 × B =	$87,334	
Insulation for Ductwork =	0.01 × B =	$43,667	
Painting =	0.01 × B =	$43,667	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$1,310,009	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$5,676,707	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$436,670	
Construction and field expenses =	0.05 × B =	$218,335	
Contractor fees =	0.10 × B =	$436,670	
Start-up =	0.02 × B =	$87,334	
Performance test =	0.01 × B =	$43,667	
	Total Indirect Costs (IC) =	$1,222,675	
Continency Cost (C) =	CF(IC+DC)=	$1,034,907	
Total Capital Investment =	**DC + IC +C =**	**$7,934,290**	**in 2025 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$418,602	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$1,003,596	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$1,473,444**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$158,686	
Property Taxes	= 1% of TCI	$79,343	
Insurance	= 1% of TCI	$79,343	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$663,936	
Indirect Annual Costs (IC) =		**$1,012,055**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$2,485,499**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$2,485,499	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	66.9	tons/year
Cost Effectiveness =	$37,145	per ton of pollutants removed in 2025 dollars

Appendix I
CU06/ST07 - CO Control Option Supporting Data

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	10	125,000	323	28.01

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{ss}) at 77°F and 1 atm.	115,000	scfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is a default pressure drop for catalytic oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	85	°F	
Operating Temperature (T_{ti})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	650	$/ft³	* $650/cubic foot is a default value for a base metal catalyst. User should enter actual value, if known.
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	390.6	1999 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G45interest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49
Footnotes			
* Greenhouse gas.			
** Hazardous air pollutant.			

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Catalyst Cost ($/ft³)	650	Based on 2014 vendor data for base metal oxide catalyst.		Check with catalyst vendor.
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	10	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	10	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair}) =	(For catalytic oxidizers)	0.248	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_j$) =	10	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	125,000	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.01	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	115,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	515.8	kW		
Q_{wo}	≈ Q_{wi} =	115,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	656	°F	Note: this temperature is relevant for incinerators, but not for t	
Temperature of flue gas exiting the oxidizer (T_{fo})	= T_{fi} - T_{wo} + T_{wi} =	330	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum(-\Delta h_{ci})\, x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.00	Btu/scf	0.0	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.21 in Chapter 2 of the Cost Manual)	793.00	scfm		
Auxiliary fuel Energy Input =		695,682	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	89,792	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)		Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		793	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	115,793	scfm		

Calculation of Catalyst Volume and Estimated Temperature of Waste Gas Entering the Catalyst Bed

Volumetric Flow Rate at 60 °F and 1 atm (Q_{fi})	= $Q_{tot} \times (519)/(77\ °F + 460)$ =	111,912	scfm
Catalyst Volume (Vol_{cat})	= Q_{fi}/Φ	223.82	ft^3
Estimated inlet temperature to the catalyst bed (T_{fi}) =	(Calculated using Equation 2.28 in Chapter 2 of the Cost Manual)	900	°F

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\,(1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Future Worth Factor

Parameter	Equation	Calculated Value
Future Worth Factor (FWF) =	$i\,[1/(1+i)^y - 1]$ =	0.2303
	Where y = Catalyst Life and i= Interest Rate	

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2025 CEPI/1999 CEPCI) =	$1,839,658	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$183,966	
Sales taxes =	0.03 × A =	$55,190	
Freight =	0.05 × A =	$91,983	
	Total Purchased equipment costs (B) =	$2,170,796	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$173,664	
Handling and Erection =	0.14 × B =	$303,911	
Electrical =	0.04 × B =	$86,832	
Piping =	0.02 × B =	$43,416	
Insulation for Ductwork =	0.01 × B =	$21,708	
Painting =	0.01 × B =	$21,708	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$651,239	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$2,822,035	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$217,080	
Construction and field expenses =	0.05 × B =	$108,540	
Contractor fees =	0.10 × B =	$217,080	
Start-up =	0.02 × B =	$43,416	
Performance test =	0.01 × B =	$21,708	
	Total Indirect Costs (IC) =	$607,823	
Continency Cost (C) =	CF(IC+DC)=	$514,479	
Total Capital Investment =	**DC + IC +C =**	**$3,944,337**	**in 2025 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/$ft^3$ cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$36,185	
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$364,211	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,542,475	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$2,994,117**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$78,887	
Property Taxes	= 1% of TCI	$39,443	
Insurance	= 1% of TCI	$39,443	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$326,789	
Indirect Annual Costs (IC) =		**$515,310**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$3,509,428**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,509,428	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	20.5	tons/year
Cost Effectiveness =	$171,027	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	10	125,000	323	28.01

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_w) at 77°F and 1 atm.	115,000	scfm	
Pressure drop (ΔP)	19	inches of water	* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	85	°F	
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	536.4	2016 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G4Sinterest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	10	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	10	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair})	(For thermal oxidizers)	0.255	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	10	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	125,000	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.01	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	115,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	426.1	kW		
Q_{wo}	= Q_{wi} =	115,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	1,900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	1,356	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the regenerative oxidizer (T_{fo})	= T_{fi} - 0.95(T_{fi} - T_{wi}) =	176	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum (-\Delta h_{ci}) x_i$ Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.00	Btu/scf	0.0	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.45 in Appendix B)	226.48	scfm		
Auxiliary fuel Energy Input =		198,686	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	192,489	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion?	(Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)	Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		226	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	115,226	scfm		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i(1+i)^n/(1+i)^n - 1$ = Where n = Equipment Life and i= Interest Rate	0.0837

Cost Estimate

Direct Costs

Total Purchased equipment costs (in 2025 dollars)

Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=(2.204 x 100,000 + 11.57 Qtot) x (2025 CEPI/1999 CEPCI) =	$2,770,403	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$277,040	
Sales taxes =	0.03 × A =	$83,112	
Freight =	0.05 × A =	$138,520	
	Total Purchased equipment costs (B) =	$3,269,075	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)

Foundations and Supports =	0.08 × B =	$261,526	
Handling and Erection =	0.14 × B =	$457,670	
Electrical =	0.04 × B =	$130,763	
Piping =	0.02 × B =	$65,381	
Insulation for Ductwork =	0.01 × B =	$32,691	
Painting =	0.01 × B =	$32,691	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$980,722	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$4,249,797	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)

Engineering =	0.10 × B =	$326,907	
Construction and field expenses =	0.05 × B =	$163,454	
Contractor fees =	0.10 × B =	$326,907	
Start-up =	0.02 × B =	$65,381	
Performance test =	0.01 × B =	$32,691	
	Total Indirect Costs (IC) =	$915,341	
Continency Cost (C) =	CF(IC+DC)=	$774,771	
Total Capital Investment =	**DC + IC +C =**	**$5,939,909**	**in 2025 dollars**

Direct Annual Costs

Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$300,870	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$726,128	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$1,078,244**	**in 2025 dollars**

Indirect Annual Costs

Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$118,798	
Property Taxes	= 1% of TCI	$59,399	
Insurance	= 1% of TCI	$59,399	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$497,048	
Indirect Annual Costs (IC) =		**$765,392**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$1,843,636**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,843,636	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	20.5	tons/year
Cost Effectiveness =	$89,847	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	10	125,000	323	28.01
VOC	7	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{ss}) at 77°F and 1 atm.	115,000	scfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is a default pressure drop for catalytic oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	85	°F	
Operating Temperature (T_{ti})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	650	$/ft³	* $650/cubic foot is a default value for a base metal catalyst. User should enter actual value, if known.
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	390.6	1999 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G45interest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49
Footnotes			
* Greenhouse gas.			
** Hazardous air pollutant.			

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Catalyst Cost ($/ft³)	650	Based on 2014 vendor data for base metal oxide catalyst.		Check with catalyst vendor.
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	10	NA
VOC	7	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	17	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair}) =	(For catalytic oxidizers)	0.248	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_j$) =	17	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_j) \times LEL_j))]^{-1}$ =	39,818	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.04	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	115,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	515.8	kW		
Q_{wo}	= Q_{wi} =	115,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	656	°F	Note: this temperature is relevant for incinerators, but not for t	
Temperature of flue gas exiting the oxidizer (T_{fo})	= T_{fi} - T_{wo} + T_{wi} =	330	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum(-\Delta h_{ci}) x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.02	Btu/scf	0.3	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.21 in Chapter 2 of the Cost Manual)	790.73	scfm		
Auxiliary fuel Energy Input =		693,694	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	89,790	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)		Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		791	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	115,791	scfm		

Calculation of Catalyst Volume and Estimated Temperature of Waste Gas Entering the Catalyst Bed

Volumetric Flow Rate at 60 °F and 1 atm (Q_{fi})	= $Q_{tot} \times (519)/(77 °F + 460)$ =	111,909	scfm
Catalyst Volume (Vol_{cat})	= Q_{fi}/Φ	223.82	ft^3
Estimated inlet temperature to the catalyst bed (T_{ri}) =	(Calculated using Equation 2.28 in Chapter 2 of the Cost Manual)	899	°F

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i (1+ i)^n/(1+ i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Future Worth Factor

Parameter	Equation	Calculated Value
Future Worth Factor (FWF) =	$i [1/(1+ i)^y - 1]$ =	0.2303
	Where y = Catalyst Life and i= Interest Rate	

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2025 CEPI/1999 CEPCI) =	$1,839,638	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$183,964	
Sales taxes =	0.03 × A =	$55,189	
Freight =	0.05 × A =	$91,982	
	Total Purchased equipment costs (B) =	$2,170,773	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$173,662	
Handling and Erection =	0.14 × B =	$303,908	
Electrical =	0.04 × B =	$86,831	
Piping =	0.02 × B =	$43,415	
Insulation for Ductwork =	0.01 × B =	$21,708	
Painting =	0.01 × B =	$21,708	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$651,232	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$2,822,005	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$217,077	
Construction and field expenses =	0.05 × B =	$108,539	
Contractor fees =	0.10 × B =	$217,077	
Start-up =	0.02 × B =	$43,415	
Performance test =	0.01 × B =	$21,708	
	Total Indirect Costs (IC) =	$607,816	
Continency Cost (C) =	CF(IC+DC)=	$514,473	
Total Capital Investment =	**DC + IC +C =**	**$3,944,294**	**in 2025 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/$ft^3$ cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$36,184	
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$364,211	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,535,210	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$2,986,851**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$78,886	
Property Taxes	= 1% of TCI	$39,443	
Insurance	= 1% of TCI	$39,443	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$326,786	
Indirect Annual Costs (IC) =		**$515,305**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$3,502,157**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,502,157	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	45.1	tons/year
Cost Effectiveness =	$77,684	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	10	125,000	323	28.01
VOC	7	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_w) at 77°F and 1 atm.	115,000	scfm	
Pressure drop (ΔP)	19	inches of water	* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	85	°F	
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	536.4	2016 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G4Sinterest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	10	NA
VOC	7	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	17	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair})	(For thermal oxidizers)	0.255	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	17	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	39,818	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.04	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	115,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	426.1	kW		
Q_{wo}	= Q_{wi} =	115,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	1,900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	1,356	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the regenerative oxidizer (T_{fo})	= T_{fi} - 0.95(T_{fi} - T_{wi}) =	176	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum (-\Delta h_{ci}) x_i$ Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.02	Btu/scf	0.3	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.45 in Appendix B)	224.23	scfm		
Auxiliary fuel Energy Input =		196,716	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	192,485	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion?	(Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)	Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		224	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	115,224	scfm		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i(1+i)^n/(1+i)^n - 1$ = Where n = Equipment Life and i= Interest Rate	0.0837

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=(2.204 x 100,000 + 11.57 Qtot) x (2025 CEPI/1999 CEPCI) =	$2,770,356	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$277,036	
Sales taxes =	0.03 × A =	$83,111	
Freight =	0.05 × A =	$138,518	
	Total Purchased equipment costs (B) =	$3,269,020	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$261,522	
Handling and Erection =	0.14 × B =	$457,663	
Electrical =	0.04 × B =	$130,761	
Piping =	0.02 × B =	$65,380	
Insulation for Ductwork =	0.01 × B =	$32,690	
Painting =	0.01 × B =	$32,690	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$980,706	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$4,249,726	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$326,902	
Construction and field expenses =	0.05 × B =	$163,451	
Contractor fees =	0.10 × B =	$326,902	
Start-up =	0.02 × B =	$65,380	
Performance test =	0.01 × B =	$32,690	
	Total Indirect Costs (IC) =	$915,326	
Continency Cost (C) =	CF(IC+DC)=	$774,758	
Total Capital Investment =	**DC + IC +C =**	**$5,939,810**	**in 2025 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$300,870	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$718,930	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$1,071,046**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$118,796	
Property Taxes	= 1% of TCI	$59,398	
Insurance	= 1% of TCI	$59,398	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$497,039	
Indirect Annual Costs (IC) =		**$765,379**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$1,836,425**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,836,425	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	45.1	tons/year
Cost Effectiveness =	$40,735	per ton of pollutants removed in 2025 dollars

Appendix J
CU08/ST09 - CO Control Option Supporting Data

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	106	125,000	323	28.01

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{ss}) at 77°F and 1 atm.	115,000	scfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is a default pressure drop for catalytic oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{ti})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	650	$/ft³	* $650/cubic foot is a default value for a base metal catalyst. User should enter actual value, if known.
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	390.6	1999 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G4Sinterest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49
Footnotes			
* Greenhouse gas.			
** Hazardous air pollutant.			

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Catalyst Cost ($/ft³)	650	Based on 2014 vendor data for base metal oxide catalyst.		Check with catalyst vendor.
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	106	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	106	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair}) =	(For catalytic oxidizers)	0.248	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	106	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_i)/((\sum x_i) \times LEL_i))]^{-1}$ =	125,000	ppmv		
	Where x_i is the volume fraction and LEL_i the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.08	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	115,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_i \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	515.8	kW		
Q_{wo}	≈ Q_{wi} =	115,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	657	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the oxidizer (T_{fo})	= T_{fi} - T_{wo} + T_{wi} =	333	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum(-\Delta h_{ci})\ x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.03	Btu/scf	0.5	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.21 in Chapter 2 of the Cost Manual)	785.24	scfm		
Auxiliary fuel Energy Input =		688,876	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	89,786	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)		Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		785	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	115,785	scfm		

Calculation of Catalyst Volume and Estimated Temperature of Waste Gas Entering the Catalyst Bed

Volumetric Flow Rate at 60 °F and 1 atm (Q_{ft})	= $Q_{tot} \times (519)/(77\ °F + 460)$ =	111,904	scfm
Catalyst Volume (Vol_{cat})	= Q_{ft}/Φ	223.81	ft^3
Estimated inlet temperature to the catalyst bed (T_{ri}) =	(Calculated using Equation 2.28 in Chapter 2 of the Cost Manual)	898	°F

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\ (1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Future Worth Factor

Parameter	Equation	Calculated Value
Future Worth Factor (FWF) =	$i\ [1/(1+i)^y - 1]$ =	0.2303
	Where y = Catalyst Life and i= Interest Rate	

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2025 CEPI/1999 CEPCI) =	$1,839,590	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$183,959	
Sales taxes =	0.03 × A =	$55,188	
Freight =	0.05 × A =	$91,979	
	Total Purchased equipment costs (B) =	$2,170,716	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$173,657	
Handling and Erection =	0.14 × B =	$303,900	
Electrical =	0.04 × B =	$86,829	
Piping =	0.02 × B =	$43,414	
Insulation for Ductwork =	0.01 × B =	$21,707	
Painting =	0.01 × B =	$21,707	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$651,215	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$2,821,931	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$217,072	
Construction and field expenses =	0.05 × B =	$108,536	
Contractor fees =	0.10 × B =	$217,072	
Start-up =	0.02 × B =	$43,414	
Performance test =	0.01 × B =	$21,707	
	Total Indirect Costs (IC) =	$607,800	
Continency Cost (C) =	CF(IC+DC)=	$514,460	
Total Capital Investment =	**DC + IC +C =**	**$3,944,191**	**in 2025 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/$ft^3$ cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$36,182	
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$364,211	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,517,602	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$2,969,242**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$78,884	
Property Taxes	= 1% of TCI	$39,442	
Insurance	= 1% of TCI	$39,442	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$326,777	
Indirect Annual Costs (IC) =		**$515,293**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$3,484,535**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,484,535	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	227.0	tons/year
Cost Effectiveness =	$15,350	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	106	125,000	323	28.01

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_w) at 77°F and 1 atm.	115,000	scfm	
Pressure drop (ΔP)	19	inches of water	* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	536.4	2016 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G4Sinterest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	106	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	106	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair})	(For thermal oxidizers)	0.255	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	106	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	125,000	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.08	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	115,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	426.1	kW		
Q_{wo}	= Q_{wi} =	115,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	1,900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	1,357	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the regenerative oxidizer (T_{fo})	= T_{fi} - 0.95(T_{fi} - T_{wi}) =	181	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum (-\Delta h_{ci})\ x_i$ Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.03	Btu/scf	0.5	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.45 in Appendix B)	221.91	scfm		
Auxiliary fuel Energy Input =		194,680	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	192,481	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)		Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		222	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	115,222	scfm		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\ (1+i)^n/(1+i)^n - 1$ = Where n = Equipment Life and i= Interest Rate	0.0837

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=(2.204 x 100,000 + 11.57 Qtot) x (2025 CEPI/1999 CEPCI) =	$2,770,308	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$277,031	
Sales taxes =	0.03 × A =	$83,109	
Freight =	0.05 × A =	$138,515	
	Total Purchased equipment costs (B) =	$3,268,964	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$261,517	
Handling and Erection =	0.14 × B =	$457,655	
Electrical =	0.04 × B =	$130,759	
Piping =	0.02 × B =	$65,379	
Insulation for Ductwork =	0.01 × B =	$32,690	
Painting =	0.01 × B =	$32,690	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$980,689	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$4,249,653	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$326,896	
Construction and field expenses =	0.05 × B =	$163,448	
Contractor fees =	0.10 × B =	$326,896	
Start-up =	0.02 × B =	$65,379	
Performance test =	0.01 × B =	$32,690	
	Total Indirect Costs (IC) =	$915,310	
Continency Cost (C) =	CF(IC+DC)=	$774,744	
Total Capital Investment =	**DC + IC +C =**	**$5,939,707**	**in 2025 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$300,870	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$711,488	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$1,063,604**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$118,794	
Property Taxes	= 1% of TCI	$59,397	
Insurance	= 1% of TCI	$59,397	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$497,031	
Indirect Annual Costs (IC) =		**$765,367**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$1,828,971**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,828,971	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	227.0	tons/year
Cost Effectiveness =	$8,057	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	106	125,000	323	28.01
VOC	38	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{ss}) at 77°F and 1 atm.	115,000	scfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is a default pressure drop for catalytic oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{ti})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	650	$/ft³	* $650/cubic foot is a default value for a base metal catalyst. User should enter actual value, if known.
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	390.6	1999 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G45interest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49
Footnotes			
* Greenhouse gas.			
** Hazardous air pollutant.			

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Catalyst Cost ($/ft³)	650	Based on 2014 vendor data for base metal oxide catalyst.		Check with catalyst vendor.
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	106	NA
VOC	38	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	144	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair}) =	(For catalytic oxidizers)	0.248	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_j$) =	144	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_j) \times LEL_j))]^{-1}$ =	53,928	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.27	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	115,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	515.8	kW		
Q_{wo}	= Q_{wi} =	115,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	657	°F	Note: this temperature is relevant for incinerators, but not for t	
Temperature of flue gas exiting the oxidizer (T_{fo})	= T_{fi} - T_{wo} + T_{wi} =	333	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum(-\Delta h_{ci})\, x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.12	Btu/scf	1.7	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.21 in Chapter 2 of the Cost Manual)	773.29	scfm		
Auxiliary fuel Energy Input =		678,389	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	89,777	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)		Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		773	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	115,773	scfm		

Calculation of Catalyst Volume and Estimated Temperature of Waste Gas Entering the Catalyst Bed

Volumetric Flow Rate at 60 °F and 1 atm (Q_{fi})	= $Q_{tot} \times (519)/(77\ °F + 460)$ =	111,893	scfm
Catalyst Volume (Vol_{cat})	= Q_{fi}/Φ	223.79	ft^3
Estimated inlet temperature to the catalyst bed (T_{ri}) =	(Calculated using Equation 2.28 in Chapter 2 of the Cost Manual)	894	°F

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\,(1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Future Worth Factor

Parameter	Equation	Calculated Value
Future Worth Factor (FWF) =	$i\,[1/(1+i)^y - 1]$ =	0.2303
	Where y = Catalyst Life and i= Interest Rate	

Cost Estimate

Direct Costs

Total Purchased equipment costs (in 2025 dollars)

Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2025 CEPI/1999 CEPCI) =	$1,839,485	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$183,948	
Sales taxes =	0.03 × A =	$55,185	
Freight =	0.05 × A =	$91,974	
	Total Purchased equipment costs (B) =	$2,170,592	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)

Foundations and Supports =	0.08 × B =	$173,647	
Handling and Erection =	0.14 × B =	$303,883	
Electrical =	0.04 × B =	$86,824	
Piping =	0.02 × B =	$43,412	
Insulation for Ductwork =	0.01 × B =	$21,706	
Painting =	0.01 × B =	$21,706	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$651,178	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$2,821,770	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)

Engineering =	0.10 × B =	$217,059	
Construction and field expenses =	0.05 × B =	$108,530	
Contractor fees =	0.10 × B =	$217,059	
Start-up =	0.02 × B =	$43,412	
Performance test =	0.01 × B =	$21,706	
	Total Indirect Costs (IC) =	$607,766	
Continency Cost (C) =	CF(IC+DC)=	$514,430	
Total Capital Investment =	**DC + IC +C =**	**$3,943,966**	**in 2025 dollars**

Direct Annual Costs

Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/$ft^3$ cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$36,179	
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$364,211	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,479,277	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$2,930,913**	**in 2025 dollars**

Indirect Annual Costs

Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$78,879	
Property Taxes	= 1% of TCI	$39,440	
Insurance	= 1% of TCI	$39,440	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$326,759	
Indirect Annual Costs (IC) =		**$515,265**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$3,446,178**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,446,178	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	356.6	tons/year
Cost Effectiveness =	$9,665	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	106	125,000	323	28.01
VOC	38	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_w) at 77°F and 1 atm.	115,000	scfm	
Pressure drop (ΔP)	19	inches of water	* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (γ)	0	years
Catalyst Unit Cost (CC)	0	$/ft³
Space velocity for catalyst (Φ)	0	/hour

Enter the cost data:

Desired dollar-year	2025			
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	536.4	2016 CEPCI
Annual Interest Rate (i)	5.50	%		
Electricity ($Cost_{elect}$)	0.08061	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$24.00	per hour		
Maintenance Labor rate	$33.00	per hour		
Contingency Factor (CF)	15.0	Percent		

*Enter dollar year first.

* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G4Sinterest rate.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	106	NA
VOC	38	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	144	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair})	(For thermal oxidizers)	0.255	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	144	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	53,928	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.27	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	115,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	426.1	kW		
Q_{wo}	= Q_{wi} =	115,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	1,900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	1,357	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the regenerative oxidizer (T_{fo})	= T_{fi} - 0.95(T_{fi} - T_{wi}) =	181	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum (-\Delta h_{ci})\ x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.12	Btu/scf	1.7	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.45 in Appendix B)	210.07	scfm		
Auxiliary fuel Energy Input =		184,290	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	192,461	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion?	(Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)	No		Note: Additional auxiliary fuel equivalent to 5% of total energy input is required to stabilize combustion.	
Auxiliary fuel flow (Qaf) (adjusted for fuel required for combustion stabilization)at 77°F and 1 atm. =		219	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af} =	115,219	scfm		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\ (1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=(2.204 x 100,000 + 11.57 Qtot) x (2025 CEPI/1999 CEPCI) =	$2,770,256	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$277,026	
Sales taxes =	0.03 × A =	$83,108	
Freight =	0.05 × A =	$138,513	
	Total Purchased equipment costs (B) =	$3,268,902	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$261,512	
Handling and Erection =	0.14 × B =	$457,646	
Electrical =	0.04 × B =	$130,756	
Piping =	0.02 × B =	$65,378	
Insulation for Ductwork =	0.01 × B =	$32,689	
Painting =	0.01 × B =	$32,689	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$980,671	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$4,249,573	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$326,890	
Construction and field expenses =	0.05 × B =	$163,445	
Contractor fees =	0.10 × B =	$326,890	
Start-up =	0.02 × B =	$65,378	
Performance test =	0.01 × B =	$32,689	
	Total Indirect Costs (IC) =	$915,293	
Continency Cost (C) =	CF(IC+DC)=	$774,730	
Total Capital Investment =	**DC + IC +C =**	**$5,939,595**	**in 2025 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$300,870	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$703,379	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$1,055,495**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$118,792	
Property Taxes	= 1% of TCI	$59,396	
Insurance	= 1% of TCI	$59,396	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$497,021	
Indirect Annual Costs (IC) =		**$765,353**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$1,820,848**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,820,848	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	356.6	tons/year
Cost Effectiveness =	$5,106	per ton of pollutants removed in 2025 dollars

Appendix K
CU01/ST02 - VOC Control Option Supporting Data

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	2	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{ss}) at 77°F and 1 atm.	160,000	scfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is a default pressure drop for catalytic oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{ti})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	650	$/ft³	* $650/cubic foot is a default value for a base metal catalyst. User should enter actual value, if known.
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	390.6	1999 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G45interest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49
Footnotes			
* Greenhouse gas.			
** Hazardous air pollutant.			

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Catalyst Cost ($/ft³)	650	Based on 2014 vendor data for base metal oxide catalyst.		Check with catalyst vendor.
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
VOC	2	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	2	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair}) =	(For catalytic oxidizers)	0.248	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_j$) =	2	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_j) \times LEL_j))]^{-1}$ =	21,000	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.01	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	160,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	717.6	kW		
Q_{wo}	≈ Q_{wi} =	160,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	657	°F	Note: this temperature is relevant for incinerators, but not for t	
Temperature of flue gas exiting the oxidizer (T_{fo})	= T_{fi} - T_{wo} + T_{wi} =	333	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum(-\Delta h_{ci})\, x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.00	Btu/scf	0.1	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.21 in Chapter 2 of the Cost Manual)	1,097.97	scfm		
Auxiliary fuel Energy Input =		963,233	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	124,924	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)		Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		1,098	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	161,098	scfm		

Calculation of Catalyst Volume and Estimated Temperature of Waste Gas Entering the Catalyst Bed

Volumetric Flow Rate at 60 °F and 1 atm (Q_{ft})	= $Q_{tot} \times (519)/(77\ °F + 460)$ =	155,698	scfm
Catalyst Volume (Vol_{cat})	= Q_{ft}/Φ	311.40	ft^3
Estimated inlet temperature to the catalyst bed (T_{ri}) =	(Calculated using Equation 2.28 in Chapter 2 of the Cost Manual)	900	°F

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\,(1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Future Worth Factor

Parameter	Equation	Calculated Value
Future Worth Factor (FWF) =	$i\,[1/(1+i)^y - 1]$ =	0.2303
	Where y = Catalyst Life and i= Interest Rate	

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2025 CEPI/1999 CEPCI) =	$2,207,997	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$220,800	
Sales taxes =	0.03 × A =	$66,240	
Freight =	0.05 × A =	$110,400	
	Total Purchased equipment costs (B) =	$2,605,437	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$208,435	
Handling and Erection =	0.14 × B =	$364,761	
Electrical =	0.04 × B =	$104,217	
Piping =	0.02 × B =	$52,109	
Insulation for Ductwork =	0.01 × B =	$26,054	
Painting =	0.01 × B =	$26,054	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$781,631	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$3,387,068	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$260,544	
Construction and field expenses =	0.05 × B =	$130,272	
Contractor fees =	0.10 × B =	$260,544	
Start-up =	0.02 × B =	$52,109	
Performance test =	0.01 × B =	$26,054	
	Total Indirect Costs (IC) =	$729,522	
Continency Cost (C) =	CF(IC+DC)=	$617,489	
Total Capital Investment =	**DC + IC +C =**	**$4,734,079**	**in 2025 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/$ft^3$ cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$50,342	
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$506,729	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$3,520,281	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$4,128,598**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$94,682	
Property Taxes	= 1% of TCI	$47,341	
Insurance	= 1% of TCI	$47,341	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$391,595	
Indirect Annual Costs (IC) =		**$611,706**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$4,740,304**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$4,740,304	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	9.0	tons/year
Cost Effectiveness =	$527,972	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	2	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_w) at 77°F and 1 atm.	160,000	scfm	
Pressure drop (ΔP)	19	inches of water	* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	536.4	2016 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G4Sinterest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
VOC	2	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	2	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair})	(For thermal oxidizers)	0.255	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	2	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	21,000	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.01	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	160,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	592.8	kW		
Q_{wo}	= Q_{wi} =	160,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	1,900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	1,357	°F	Note: this temperature is relevant for incinerators, but not for t	
Temperature of flue gas exiting the regenerative oxidizer (T_{fo})	= T_{fi} - 0.95(T_{fi} - T_{wi}) =	181	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum (-\Delta h_{ci}) x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.00	Btu/scf	0.1	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.45 in Appendix B)	314.17	scfm		
Auxiliary fuel Energy Input =		275,612	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	267,809	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion?	(Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)	Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		314	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	160,314	scfm		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i(1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Cost Estimate

Direct Costs

Total Purchased equipment costs (in 2025 dollars)

Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=(2.204 x 100,000 + 11.57 Qtot) x (2025 CEPI/1999 CEPCI) =	$3,700,615	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$370,061	
Sales taxes =	0.03 × A =	$111,018	
Freight =	0.05 × A =	$185,031	
	Total Purchased equipment costs (B) =	$4,366,726	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)

Foundations and Supports =	0.08 × B =	$349,338	
Handling and Erection =	0.14 × B =	$611,342	
Electrical =	0.04 × B =	$174,669	
Piping =	0.02 × B =	$87,335	
Insulation for Ductwork =	0.01 × B =	$43,667	
Painting =	0.01 × B =	$43,667	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$1,310,018	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$5,676,743	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)

Engineering =	0.10 × B =	$436,673	
Construction and field expenses =	0.05 × B =	$218,336	
Contractor fees =	0.10 × B =	$436,673	
Start-up =	0.02 × B =	$87,335	
Performance test =	0.01 × B =	$43,667	
	Total Indirect Costs (IC) =	$1,222,683	
Continency Cost (C) =	CF(IC+DC)=	$1,034,914	
Total Capital Investment =	**DC + IC +C =**	**$7,934,340**	**in 2025 dollars**

Direct Annual Costs

Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$418,602	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$1,007,265	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$1,477,113**	**in 2025 dollars**

Indirect Annual Costs

Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$158,687	
Property Taxes	= 1% of TCI	$79,343	
Insurance	= 1% of TCI	$79,343	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$663,940	
Indirect Annual Costs (IC) =		**$1,012,062**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$2,489,174**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$2,489,174	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	9.0	tons/year
Cost Effectiveness =	$277,243	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	19	125,000	323	28.01
VOC	2	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{ss}) at 77°F and 1 atm.	160,000	scfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is a default pressure drop for catalytic oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{ti})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	650	$/ft³	* $650/cubic foot is a default value for a base metal catalyst. User should enter actual value, if known.
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	390.6	1999 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G45interest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49
Footnotes			
* Greenhouse gas.			
** Hazardous air pollutant.			

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Catalyst Cost ($/ft³)	650	Based on 2014 vendor data for base metal oxide catalyst.		Check with catalyst vendor.
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	19	NA
VOC	2	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	21	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair}) =	(For catalytic oxidizers)	0.248	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= $(\sum x_j)$ =	21	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_j) \times LEL_j))]^{-1}$ =	86,572	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.02	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/$(\sum x_i)$ =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	160,000	scfm		
Oxygen Content of gas stream	= 100 - $(\sum x_j \times 100/10^6)$ =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	717.6	kW		
Q_{wo}	= Q_{wi} =	160,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	657	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the oxidizer (T_{fo})	= T_{fi} - T_{wo} + T_{wi} =	333	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum(-\Delta h_{ci})\, x_i$				
	Where $(-\Delta h_{ci})$ is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.01	Btu/scf	0.1	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.21 in Chapter 2 of the Cost Manual)	1,096.82	scfm		
Auxiliary fuel Energy Input =		962,220	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × ρ_{fi} × Q_{fi} × C_{pmfi} × (T_{fi} - T_{ref}) =	124,923	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)		Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		1,097	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af} =	161,097	scfm		
Calculation of Catalyst Volume and Estimated Temperature of Waste Gas Entering the Catalyst Bed					
Volumetric Flow Rate at 60 °F and 1 atm (Q_{fi})	= Q_{tot} × (519)/(77 °F + 460) =	155,697	scfm		
Catalyst Volume (Vol_{cat})	= Q_{fi}/Φ	311.39	ft^3		
Estimated inlet temperature to the catalyst bed (T_{fi}) =	(Calculated using Equation 2.28 in Chapter 2 of the Cost Manual)	899	°F		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\,(1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Future Worth Factor

Parameter	Equation	Calculated Value
Future Worth Factor (FWF) =	$i\,[1/(1+i)^y - 1]$ =	0.2303
	Where y = Catalyst Life and i= Interest Rate	

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2025 CEPI/1999 CEPCI) =	$2,207,989	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$220,799	
Sales taxes =	0.03 × A =	$66,240	
Freight =	0.05 × A =	$110,399	
	Total Purchased equipment costs (B) =	$2,605,427	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$208,434	
Handling and Erection =	0.14 × B =	$364,760	
Electrical =	0.04 × B =	$104,217	
Piping =	0.02 × B =	$52,109	
Insulation for Ductwork =	0.01 × B =	$26,054	
Painting =	0.01 × B =	$26,054	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$781,628	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$3,387,055	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$260,543	
Construction and field expenses =	0.05 × B =	$130,271	
Contractor fees =	0.10 × B =	$260,543	
Start-up =	0.02 × B =	$52,109	
Performance test =	0.01 × B =	$26,054	
	Total Indirect Costs (IC) =	$729,519	
Continency Cost (C) =	CF(IC+DC)=	$617,486	
Total Capital Investment =	**DC + IC +C =**	**$4,734,060**	**in 2025 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/$ft^3$ cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$50,342	
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$506,729	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$3,516,579	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$4,124,895**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$94,681	
Property Taxes	= 1% of TCI	$47,341	
Insurance	= 1% of TCI	$47,341	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$391,593	
Indirect Annual Costs (IC) =		**$611,703**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$4,736,599**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$4,736,599	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	66.9	tons/year
Cost Effectiveness =	$70,788	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	19	125,000	323	28.01
VOC	2	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	160,000	scfm	
Pressure drop (ΔP)	19	inches of water	* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2025			
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	536.4	2016 CEPCI
Annual Interest Rate (i)	5.50	%		
Electricity ($Cost_{elect}$)	0.08061	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$24.00	per hour		
Maintenance Labor rate	$33.00	per hour		
Contingency Factor (CF)	15.0	Percent		

*Enter dollar year first.

* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G45interest rate.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	19	NA
VOC	2	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	21	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair})	(For thermal oxidizers)	0.255	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	21	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	86,572	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.02	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	160,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	592.8	kW		
Q_{wo}	= Q_{wi} =	160,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	1,900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	1,357	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the regenerative oxidizer (T_{fo})	= T_{fi} - 0.95(T_{fi} - T_{wi}) =	181	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum (-\Delta h_{ci})\ x_i$ Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.01	Btu/scf	0.1	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.45 in Appendix B)	313.02	scfm		
Auxiliary fuel Energy Input =		274,608	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	267,807	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion?	(Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)	Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		313	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	160,313	scfm		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\ (1+i)^n/(1+i)^n - 1$ = Where n = Equipment Life and i= Interest Rate	0.0837

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=(2.204 x 100,000 + 11.57 Qtot) x (2025 CEPI/1999 CEPCI) =	$3,700,591	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$370,059	
Sales taxes =	0.03 × A =	$111,018	
Freight =	0.05 × A =	$185,030	
	Total Purchased equipment costs (B) =	$4,366,698	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$349,336	
Handling and Erection =	0.14 × B =	$611,338	
Electrical =	0.04 × B =	$174,668	
Piping =	0.02 × B =	$87,334	
Insulation for Ductwork =	0.01 × B =	$43,667	
Painting =	0.01 × B =	$43,667	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$1,310,009	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$5,676,707	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$436,670	
Construction and field expenses =	0.05 × B =	$218,335	
Contractor fees =	0.10 × B =	$436,670	
Start-up =	0.02 × B =	$87,334	
Performance test =	0.01 × B =	$43,667	
	Total Indirect Costs (IC) =	$1,222,675	
Continency Cost (C) =	CF(IC+DC)=	$1,034,907	
Total Capital Investment =	**DC + IC +C =**	**$7,934,290**	**in 2025 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$418,602	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$1,003,596	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$1,473,444**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$158,686	
Property Taxes	= 1% of TCI	$79,343	
Insurance	= 1% of TCI	$79,343	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$663,936	
Indirect Annual Costs (IC) =		**$1,012,055**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$2,485,499**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$2,485,499	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	66.9	tons/year
Cost Effectiveness =	$37,145	per ton of pollutants removed in 2025 dollars

Appendix L
CU06/ST07 - VOC Control Option Supporting Data

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	7	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	105,000	scfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is a default pressure drop for catalytic oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	85	°F	
Operating Temperature (T_{ti})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (γ)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	650	$/ft³	* $650/cubic foot is a default value for a base metal catalyst. User should enter actual value, if known.
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	390.6	1999 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G45interest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Catalyst Cost ($/ft³)	650	Based on 2014 vendor data for base metal oxide catalyst.		Check with catalyst vendor.
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
VOC	7	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	7	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair}) =	(For catalytic oxidizers)	0.248	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	$= (\sum x_i) =$	7	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	$= [\sum((x_i)/((\sum x_i) \times LEL_i))]^{-1} =$	21,000	ppmv		
	Where x_i is the volume fraction and LEL_i the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.03	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	$= (LEL_{mix} \times 0.249)/(\sum x_i) =$	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	105,000	scfm		
Oxygen Content of gas stream	$= 100 - (\sum x_i \times 100/10^6) =$	20.90	percent		
Fan Power Consumption (FP)	$= [(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	470.9	kW		
Q_{wo}	$\approx Q_{wi} =$	105,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	656	°F	Note: this temperature is relevant for incinerators, but not for t	
Temperature of flue gas exiting the oxidizer (T_{fo})	$= T_{fi} - T_{wo} + T_{wi} =$	330	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	$= \sum (-\Delta h_{ci}) x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.02	Btu/scf	0.2	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.21 in Chapter 2 of the Cost Manual)	722.35	scfm		
Auxiliary fuel Energy Input =		633,700	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = $0.05 \times \rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref}) =$	81,983	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)		Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		722	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	$= Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af} =$	105,722	scfm		
Calculation of Catalyst Volume and Estimated Temperature of Waste Gas Entering the Catalyst Bed					
Volumetric Flow Rate at 60 °F and 1 atm (Q_{fi})	$= Q_{tot} \times (519)/(77\ °F + 460) =$	102,179	scfm		
Catalyst Volume (Vol_{cat})	$= Q_{fi}/\Phi$	204.36	ft^3		
Estimated inlet temperature to the catalyst bed (T_{ri}) =	(Calculated using Equation 2.28 in Chapter 2 of the Cost Manual)	899	°F		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\ (1+i)^n/(1+i)^n - 1 =$	0.0837
	Where n = Equipment Life and i= Interest Rate	

Future Worth Factor

Parameter	Equation	Calculated Value
Future Worth Factor (FWF) =	$i\ [1/(1+i)^y - 1] =$	0.2303
	Where y = Catalyst Life and i= Interest Rate	

Cost Estimate

Direct Costs

Total Purchased equipment costs (in 2025 dollars)

Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2025 CEPI/1999 CEPCI) =	$1,749,431	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$174,943	
Sales taxes =	0.03 × A =	$52,483	
Freight =	0.05 × A =	$87,472	
	Total Purchased equipment costs (B) =	$2,064,329	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)

Foundations and Supports =	0.08 × B =	$165,146	
Handling and Erection =	0.14 × B =	$289,006	
Electrical =	0.04 × B =	$82,573	
Piping =	0.02 × B =	$41,287	
Insulation for Ductwork =	0.01 × B =	$20,643	
Painting =	0.01 × B =	$20,643	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$619,299	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$2,683,627	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)

Engineering =	0.10 × B =	$206,433	
Construction and field expenses =	0.05 × B =	$103,216	
Contractor fees =	0.10 × B =	$206,433	
Start-up =	0.02 × B =	$41,287	
Performance test =	0.01 × B =	$20,643	
	Total Indirect Costs (IC) =	$578,012	
Continency Cost (C) =	CF(IC+DC)=	$489,246	
Total Capital Investment =	**DC + IC +C =**	**$3,750,885**	**in 2025 dollars**

Direct Annual Costs

Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/$ft^3$ cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$33,038	
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$332,541	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,315,954	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$2,732,779**	**in 2025 dollars**

Indirect Annual Costs

Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$75,018	
Property Taxes	= 1% of TCI	$37,509	
Insurance	= 1% of TCI	$37,509	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$310,886	
Indirect Annual Costs (IC) =		**$491,669**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$3,224,448**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,224,448	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	22.4	tons/year
Cost Effectiveness =	$143,777	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	7	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_w) at 77°F and 1 atm.	105,000	scfm	
Pressure drop (ΔP)	19	inches of water	* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	85	°F	
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	536.4	2016 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G4Sinterest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
VOC	7	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	7	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair})	(For thermal oxidizers)	0.255	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	7	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	21,000	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.03	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	105,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	389.0	kW		
Q_{wo}	= Q_{wi} =	105,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	1,900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	1,356	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the regenerative oxidizer (T_{fo})	= T_{fi} - 0.95(T_{fi} - T_{wi}) =	176	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum (-\Delta h_{ci}) x_i$ Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.02	Btu/scf	0.2	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.45 in Appendix B)	205.11	scfm		
Auxiliary fuel Energy Input =		179,935	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	175,748	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)	(Note: If the	Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		205	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	105,205	scfm		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i(1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Cost Estimate

Direct Costs

Total Purchased equipment costs (in 2025 dollars)

Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=(2.204 x 100,000 + 11.57 Qtot) x (2025 CEPI/1999 CEPCI) =	$2,563,650	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$256,365	
Sales taxes =	0.03 × A =	$76,909	
Freight =	0.05 × A =	$128,182	
	Total Purchased equipment costs (B) =	$3,025,107	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)

Foundations and Supports =	0.08 × B =	$242,009	
Handling and Erection =	0.14 × B =	$423,515	
Electrical =	0.04 × B =	$121,004	
Piping =	0.02 × B =	$60,502	
Insulation for Ductwork =	0.01 × B =	$30,251	
Painting =	0.01 × B =	$30,251	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$907,532	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$3,932,639	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)

Engineering =	0.10 × B =	$302,511	
Construction and field expenses =	0.05 × B =	$151,255	
Contractor fees =	0.10 × B =	$302,511	
Start-up =	0.02 × B =	$60,502	
Performance test =	0.01 × B =	$30,251	
	Total Indirect Costs (IC) =	$847,030	
Continency Cost (C) =	CF(IC+DC)=	$716,950	
Total Capital Investment =	**DC + IC +C =**	**$5,496,619**	**in 2025 dollars**

Direct Annual Costs

Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$274,708	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$657,601	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$983,554**	**in 2025 dollars**

Indirect Annual Costs

Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$109,932	
Property Taxes	= 1% of TCI	$54,966	
Insurance	= 1% of TCI	$54,966	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$459,953	
Indirect Annual Costs (IC) =		**$710,566**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$1,694,120**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,694,120	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	22.4	tons/year
Cost Effectiveness =	$75,540	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	10	125,000	323	28.01
VOC	7	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{ss}) at 77°F and 1 atm.	115,000	scfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is a default pressure drop for catalytic oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	85	°F	
Operating Temperature (T_{ti})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	650	$/ft³	* $650/cubic foot is a default value for a base metal catalyst. User should enter actual value, if known.
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	390.6	1999 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G45interest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49
Footnotes			
* Greenhouse gas.			
** Hazardous air pollutant.			

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Catalyst Cost ($/ft³)	650	Based on 2014 vendor data for base metal oxide catalyst.		Check with catalyst vendor.
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	10	NA
VOC	7	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	17	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair}) =	(For catalytic oxidizers)	0.248	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_j$) =	17	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_j) \times LEL_j))]^{-1}$ =	39,818	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.04	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	115,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	515.8	kW		
Q_{wo}	= Q_{wi} =	115,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	656	°F	Note: this temperature is relevant for incinerators, but not for t	
Temperature of flue gas exiting the oxidizer (T_{fo})	= T_{fi} - T_{wo} + T_{wi} =	330	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum(-\Delta h_{ci}) x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.02	Btu/scf	0.3	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.21 in Chapter 2 of the Cost Manual)	790.73	scfm		
Auxiliary fuel Energy Input =		693,694	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	89,790	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)		Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		791	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	115,791	scfm		

Calculation of Catalyst Volume and Estimated Temperature of Waste Gas Entering the Catalyst Bed

Volumetric Flow Rate at 60 °F and 1 atm (Q_{fi})	= $Q_{tot} \times (519)/(77 °F + 460)$ =	111,909	scfm
Catalyst Volume (Vol_{cat})	= Q_{fi}/Φ	223.82	ft^3
Estimated inlet temperature to the catalyst bed (T_{ri}) =	(Calculated using Equation 2.28 in Chapter 2 of the Cost Manual)	899	°F

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i (1+ i)^n/(1+ i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Future Worth Factor

Parameter	Equation	Calculated Value
Future Worth Factor (FWF) =	$i [1/(1+ i)^y - 1]$ =	0.2303
	Where y = Catalyst Life and i= Interest Rate	

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2025 CEPI/1999 CEPCI) =	$1,839,638	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$183,964	
Sales taxes =	0.03 × A =	$55,189	
Freight =	0.05 × A =	$91,982	
	Total Purchased equipment costs (B) =	$2,170,773	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$173,662	
Handling and Erection =	0.14 × B =	$303,908	
Electrical =	0.04 × B =	$86,831	
Piping =	0.02 × B =	$43,415	
Insulation for Ductwork =	0.01 × B =	$21,708	
Painting =	0.01 × B =	$21,708	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$651,232	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$2,822,005	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$217,077	
Construction and field expenses =	0.05 × B =	$108,539	
Contractor fees =	0.10 × B =	$217,077	
Start-up =	0.02 × B =	$43,415	
Performance test =	0.01 × B =	$21,708	
	Total Indirect Costs (IC) =	$607,816	
Continency Cost (C) =	CF(IC+DC)=	$514,473	
Total Capital Investment =	**DC + IC +C =**	**$3,944,294**	**in 2025 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/$ft^3$ cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$36,184	
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$364,211	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,535,210	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$2,986,851**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$78,886	
Property Taxes	= 1% of TCI	$39,443	
Insurance	= 1% of TCI	$39,443	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$326,786	
Indirect Annual Costs (IC) =		**$515,305**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$3,502,157**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,502,157	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	45.1	tons/year
Cost Effectiveness =	$77,684	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	10	125,000	323	28.01
VOC	7	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_w) at 77°F and 1 atm.	115,000	scfm	
Pressure drop (ΔP)	19	inches of water	* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	85	°F	
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	536.4	2016 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G4Sinterest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	10	NA
VOC	7	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	17	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair})	(For thermal oxidizers)	0.255	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	17	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	39,818	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.04	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	115,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	426.1	kW		
Q_{wo}	= Q_{wi} =	115,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	1,900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	1,356	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the regenerative oxidizer (T_{fo})	= T_{fi} - 0.95(T_{fi} - T_{wi}) =	176	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum (-\Delta h_{ci}) x_i$ Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.02	Btu/scf	0.3	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.45 in Appendix B)	224.23	scfm		
Auxiliary fuel Energy Input =		196,716	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	192,485	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion?	(Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)	Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		224	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	115,224	scfm		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i(1+i)^n/(1+i)^n - 1$ = Where n = Equipment Life and i= Interest Rate	0.0837

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=(2.204 x 100,000 + 11.57 Qtot) x (2025 CEPI/1999 CEPCI) =	$2,770,356	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$277,036	
Sales taxes =	0.03 × A =	$83,111	
Freight =	0.05 × A =	$138,518	
	Total Purchased equipment costs (B) =	$3,269,020	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$261,522	
Handling and Erection =	0.14 × B =	$457,663	
Electrical =	0.04 × B =	$130,761	
Piping =	0.02 × B =	$65,380	
Insulation for Ductwork =	0.01 × B =	$32,690	
Painting =	0.01 × B =	$32,690	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$980,706	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$4,249,726	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$326,902	
Construction and field expenses =	0.05 × B =	$163,451	
Contractor fees =	0.10 × B =	$326,902	
Start-up =	0.02 × B =	$65,380	
Performance test =	0.01 × B =	$32,690	
	Total Indirect Costs (IC) =	$915,326	
Continency Cost (C) =	CF(IC+DC)=	$774,758	
Total Capital Investment =	**DC + IC +C =**	**$5,939,810**	**in 2025 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$300,870	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$718,930	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$1,071,046**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$118,796	
Property Taxes	= 1% of TCI	$59,398	
Insurance	= 1% of TCI	$59,398	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$497,039	
Indirect Annual Costs (IC) =		**$765,379**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$1,836,425**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,836,425	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	45.1	tons/year
Cost Effectiveness =	$40,735	per ton of pollutants removed in 2025 dollars

Appendix M
CU08/ST09 - VOC Control Option Supporting Data

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	38	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	115,000	scfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is a default pressure drop for catalytic oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{fi})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	650	$/ft³	* $650/cubic foot is a default value for a base metal catalyst. User should enter actual value, if known.
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	390.6	1999 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G4Sinterest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49
Footnotes			
* Greenhouse gas.			
** Hazardous air pollutant.			

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Catalyst Cost ($/ft³)	650	Based on 2014 vendor data for base metal oxide catalyst.		Check with catalyst vendor.
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
VOC	38	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	38	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair}) =	(For catalytic oxidizers)	0.248	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_j$) =	38	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_j) \times LEL_j))]^{-1}$ =	21,000	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.18	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	115,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	515.8	kW		
Q_{wo}	≈ Q_{wi} =	115,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	657	°F	Note: this temperature is relevant for incinerators, but not for t	
Temperature of flue gas exiting the oxidizer (T_{fo})	= T_{fi} - T_{wo} + T_{wi} =	333	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum(-\Delta h_{ci})\, x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.09	Btu/scf	1.2	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.21 in Chapter 2 of the Cost Manual)	777.81	scfm		
Auxiliary fuel Energy Input =		682,359	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	89,780	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)		Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		778	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	115,778	scfm		

Calculation of Catalyst Volume and Estimated Temperature of Waste Gas Entering the Catalyst Bed

Volumetric Flow Rate at 60 °F and 1 atm (Q_{fi})	= $Q_{tot} \times (519)/(77\ °F + 460)$ =	111,897	scfm
Catalyst Volume (Vol_{cat})	= Q_{fi}/Φ	223.79	ft^3
Estimated inlet temperature to the catalyst bed (T_{ri}) =	(Calculated using Equation 2.28 in Chapter 2 of the Cost Manual)	896	°F

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\,(1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Future Worth Factor

Parameter	Equation	Calculated Value
Future Worth Factor (FWF) =	$i\,[1/(1+i)^y - 1]$ =	0.2303
	Where y = Catalyst Life and i= Interest Rate	

Cost Estimate

Direct Costs

Total Purchased equipment costs (in 2025 dollars)

Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2025 CEPI/1999 CEPCI) =	$1,839,525	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$183,952	
Sales taxes =	0.03 × A =	$55,186	
Freight =	0.05 × A =	$91,976	
	Total Purchased equipment costs (B) =	$2,170,639	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)

Foundations and Supports =	0.08 × B =	$173,651	
Handling and Erection =	0.14 × B =	$303,889	
Electrical =	0.04 × B =	$86,826	
Piping =	0.02 × B =	$43,413	
Insulation for Ductwork =	0.01 × B =	$21,706	
Painting =	0.01 × B =	$21,706	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$651,192	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$2,821,831	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)

Engineering =	0.10 × B =	$217,064	
Construction and field expenses =	0.05 × B =	$108,532	
Contractor fees =	0.10 × B =	$217,064	
Start-up =	0.02 × B =	$43,413	
Performance test =	0.01 × B =	$21,706	
	Total Indirect Costs (IC) =	$607,779	
Continency Cost (C) =	CF(IC+DC)=	$514,441	
Total Capital Investment =	**DC + IC +C =**	**$3,944,051**	**in 2025 dollars**

Direct Annual Costs

Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/$ft^3$ cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$36,180	
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$364,211	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,493,785	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$2,945,423**	**in 2025 dollars**

Indirect Annual Costs

Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$78,881	
Property Taxes	= 1% of TCI	$39,441	
Insurance	= 1% of TCI	$39,441	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$326,766	
Indirect Annual Costs (IC) =		**$515,275**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$3,460,698**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,460,698	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	129.6	tons/year
Cost Effectiveness =	$26,709	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	38	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{wi}) at 77°F and 1 atm.	115,000	scfm	
Pressure drop (ΔP)	19	inches of water	* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{ti})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (γ)	0	years
Catalyst Unit Cost (CC)	0	$/ft³
Space velocity for catalyst (Φ)	0	/hour

Enter the cost data:

Desired dollar-year	2025			
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	536.4	2016 CEPCI
Annual Interest Rate (i)	5.50	%		
Electricity ($Cost_{elect}$)	0.08061	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$24.00	per hour		
Maintenance Labor rate	$33.00	per hour		
Contingency Factor (CF)	15.0	Percent		

*Enter dollar year first.

* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G4Sinterest rate.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
VOC	38	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	38	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair})	(For thermal oxidizers)	0.255	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	38	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	21,000	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.18	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	115,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	426.1	kW		
Q_{wo}	= Q_{wi} =	115,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	1,900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	1,357	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the regenerative oxidizer (T_{fo})	= T_{fi} - 0.95(T_{fi} - T_{wi}) =	181	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum (-\Delta h_{ci})\ x_i$ Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.09	Btu/scf	1.2	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.45 in Appendix B)	214.55	scfm		
Auxiliary fuel Energy Input =		188,223	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	192,469	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion?	(Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)	No		Note: Additional auxiliary fuel equivalent to 5% of total energy input is required to stabilize combustion.	
Auxiliary fuel flow (Qaf) (adjusted for fuel required for combustion stabilization)at 77°F and 1 atm. =		219	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af} =	115,219	scfm		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\ (1+i)^n/(1+i)^n - 1$ = Where n = Equipment Life and i= Interest Rate	0.0837

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=(2.204 x 100,000 + 11.57 Qtot) x (2025 CEPI/1999 CEPCI) =	$2,770,256	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$277,026	
Sales taxes =	0.03 × A =	$83,108	
Freight =	0.05 × A =	$138,513	
	Total Purchased equipment costs (B) =	$3,268,902	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$261,512	
Handling and Erection =	0.14 × B =	$457,646	
Electrical =	0.04 × B =	$130,756	
Piping =	0.02 × B =	$65,378	
Insulation for Ductwork =	0.01 × B =	$32,689	
Painting =	0.01 × B =	$32,689	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$980,671	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$4,249,573	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$326,890	
Construction and field expenses =	0.05 × B =	$163,445	
Contractor fees =	0.10 × B =	$326,890	
Start-up =	0.02 × B =	$65,378	
Performance test =	0.01 × B =	$32,689	
	Total Indirect Costs (IC) =	$915,293	
Continency Cost (C) =	CF(IC+DC)=	$774,730	
Total Capital Investment =	**DC + IC +C =**	**$5,939,596**	**in 2025 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$300,870	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$703,406	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$1,055,523**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$118,792	
Property Taxes	= 1% of TCI	$59,396	
Insurance	= 1% of TCI	$59,396	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$497,021	
Indirect Annual Costs (IC) =		**$765,353**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$1,820,875**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,820,875	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	129.6	tons/year
Cost Effectiveness =	$14,053	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	106	125,000	323	28.01
VOC	38	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{ss}) at 77°F and 1 atm.	115,000	scfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is a default pressure drop for catalytic oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{ti})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	650	$/ft³	* $650/cubic foot is a default value for a base metal catalyst. User should enter actual value, if known.
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	390.6	1999 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G45interest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49
Footnotes			
* Greenhouse gas.			
** Hazardous air pollutant.			

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Catalyst Cost ($/ft³)	650	Based on 2014 vendor data for base metal oxide catalyst.		Check with catalyst vendor.
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	106	NA
VOC	38	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	144	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair}) =	(For catalytic oxidizers)	0.248	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_j$) =	144	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_j) \times LEL_j))]^{-1}$ =	53,928	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.27	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	115,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	515.8	kW		
Q_{wo}	= Q_{wi} =	115,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	657	°F	Note: this temperature is relevant for incinerators, but not for t	
Temperature of flue gas exiting the oxidizer (T_{fo})	= T_{fi} - T_{wo} + T_{wi} =	333	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum(-\Delta h_{ci})\, x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.12	Btu/scf	1.7	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.21 in Chapter 2 of the Cost Manual)	773.29	scfm		
Auxiliary fuel Energy Input =		678,389	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	89,777	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)		Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		773	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	115,773	scfm		

Calculation of Catalyst Volume and Estimated Temperature of Waste Gas Entering the Catalyst Bed

Volumetric Flow Rate at 60 °F and 1 atm (Q_{fi})	= $Q_{tot} \times (519)/(77\ °F + 460)$ =	111,893	scfm
Catalyst Volume (Vol_{cat})	= Q_{fi}/Φ	223.79	ft^3
Estimated inlet temperature to the catalyst bed (T_{ri}) =	(Calculated using Equation 2.28 in Chapter 2 of the Cost Manual)	894	°F

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\,(1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Future Worth Factor

Parameter	Equation	Calculated Value
Future Worth Factor (FWF) =	$i\,[1/(1+i)^y - 1]$ =	0.2303
	Where y = Catalyst Life and i= Interest Rate	

Cost Estimate

Direct Costs

Total Purchased equipment costs (in 2025 dollars)

Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2025 CEPI/1999 CEPCI) =	$1,839,485	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$183,948	
Sales taxes =	0.03 × A =	$55,185	
Freight =	0.05 × A =	$91,974	
	Total Purchased equipment costs (B) =	$2,170,592	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)

Foundations and Supports =	0.08 × B =	$173,647	
Handling and Erection =	0.14 × B =	$303,883	
Electrical =	0.04 × B =	$86,824	
Piping =	0.02 × B =	$43,412	
Insulation for Ductwork =	0.01 × B =	$21,706	
Painting =	0.01 × B =	$21,706	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$651,178	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$2,821,770	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)

Engineering =	0.10 × B =	$217,059	
Construction and field expenses =	0.05 × B =	$108,530	
Contractor fees =	0.10 × B =	$217,059	
Start-up =	0.02 × B =	$43,412	
Performance test =	0.01 × B =	$21,706	
	Total Indirect Costs (IC) =	$607,766	
Continency Cost (C) =	CF(IC+DC)=	$514,430	
Total Capital Investment =	**DC + IC +C =**	**$3,943,966**	**in 2025 dollars**

Direct Annual Costs

Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/$ft^3$ cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$36,179	
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$364,211	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$2,479,277	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$2,930,913**	**in 2025 dollars**

Indirect Annual Costs

Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$78,879	
Property Taxes	= 1% of TCI	$39,440	
Insurance	= 1% of TCI	$39,440	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$326,759	
Indirect Annual Costs (IC) =		**$515,265**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$3,446,178**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$3,446,178	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	356.6	tons/year
Cost Effectiveness =	$9,665	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Carbon Monoxide	106	125,000	323	28.01
VOC	38	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_w) at 77°F and 1 atm.	115,000	scfm	
Pressure drop (ΔP)	19	inches of water	* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	90	°F	
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (γ)	0	years
Catalyst Unit Cost (CC)	0	$/ft³
Space velocity for catalyst (Φ)	0	/hour

Enter the cost data:

Desired dollar-year	2025			
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	536.4	2016 CEPCI
Annual Interest Rate (i)	5.50	%		
Electricity ($Cost_{elect}$)	0.08061	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$24.00	per hour		
Maintenance Labor rate	$33.00	per hour		
Contingency Factor (CF)	15.0	Percent		

*Enter dollar year first.

* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G4Sinterest rate.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
Carbon Monoxide	106	NA
VOC	38	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	144	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair})	(For thermal oxidizers)	0.255	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	144	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	53,928	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.27	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	115,000	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	426.1	kW		
Q_{wo}	= Q_{wi} =	115,000	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	1,900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	1,357	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the regenerative oxidizer (T_{fo})	= T_{fi} - 0.95(T_{fi} - T_{wi}) =	181	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum (-\Delta h_{ci})\ x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.12	Btu/scf	1.7	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.45 in Appendix B)	210.07	scfm		
Auxiliary fuel Energy Input =		184,290	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	192,461	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion?	(Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)	No		Note: Additional auxiliary fuel equivalent to 5% of total energy input is required to stabilize combustion.	
Auxiliary fuel flow (Qaf) (adjusted for fuel required for combustion stabilization)at 77°F and 1 atm. =		219	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af} =	115,219	scfm		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\ (1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=(2.204 x 100,000 + 11.57 Qtot) x (2025 CEPI/1999 CEPCI) =	$2,770,256	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$277,026	
Sales taxes =	0.03 × A =	$83,108	
Freight =	0.05 × A =	$138,513	
	Total Purchased equipment costs (B) =	$3,268,902	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$261,512	
Handling and Erection =	0.14 × B =	$457,646	
Electrical =	0.04 × B =	$130,756	
Piping =	0.02 × B =	$65,378	
Insulation for Ductwork =	0.01 × B =	$32,689	
Painting =	0.01 × B =	$32,689	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$980,671	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$4,249,573	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$326,890	
Construction and field expenses =	0.05 × B =	$163,445	
Contractor fees =	0.10 × B =	$326,890	
Start-up =	0.02 × B =	$65,378	
Performance test =	0.01 × B =	$32,689	
	Total Indirect Costs (IC) =	$915,293	
Continency Cost (C) =	CF(IC+DC)=	$774,730	
Total Capital Investment =	**DC + IC +C =**	**$5,939,595**	**in 2025 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$300,870	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$703,379	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$1,055,495**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$118,792	
Property Taxes	= 1% of TCI	$59,396	
Insurance	= 1% of TCI	$59,396	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$497,021	
Indirect Annual Costs (IC) =		**$765,353**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$1,820,848**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$1,820,848	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	356.6	tons/year
Cost Effectiveness =	$5,106	per ton of pollutants removed in 2025 dollars

Appendix N
CU07/ST08 - VOC Control Option Supporting Data

Data Inputs

Select the type of oxidizer: Catalytic Oxidizer - Fixed Bed

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	63	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_{ss}) at 77°F and 1 atm.	7,500	scfm	
Pressure drop (ΔP)	23	inches of water*	* 23 inches of water is a default pressure drop for catalytic oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	80	°F	
Operating Temperature (T_{ti})	900	°F	* Note: Default value for Tfi is 900°F for catalytic oxidizers. Use actual value if known. Tfi for catalytic oxidizers is typically between 300 and 900°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Catalyst Data:

Estimated catalyst life (y)	4	years	* 4 years is a default value. User should enter actual value, if known.
Catalyst Unit Cost (CC)	650	$/ft³	* $650/cubic foot is a default value for a base metal catalyst. User should enter actual value, if known.
Space velocity for catalyst (Φ)	30,000	/hour	* 30,000 per hour is a default value. User should enter actual value, if known.

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	390.6	1999 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G45interest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49
Footnotes			
* Greenhouse gas.			
** Hazardous air pollutant.			

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Catalyst Cost ($/ft³)	650	Based on 2014 vendor data for base metal oxide catalyst.		Check with catalyst vendor.
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
VOC	63	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	63	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair}) =	(For catalytic oxidizers)	0.248	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_j$) =	63	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_j) \times LEL_j))]^{-1}$ =	21,000	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.30	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	7,500	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	33.6	kW		
Q_{wo}	≈ Q_{wi} =	7,500	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	654	°F	Note: this temperature is relevant for incinerators, but not for t	
Temperature of flue gas exiting the oxidizer (T_{fo})	= T_{fi} - T_{wo} + T_{wi} =	326	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum(-\Delta h_{ci})\, x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.15	Btu/scf	2.0	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.21 in Chapter 2 of the Cost Manual)	50.69	scfm		
Auxiliary fuel Energy Input =		44,473	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	5,855	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion? (Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)		Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		51	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	7,551	scfm		

Calculation of Catalyst Volume and Estimated Temperature of Waste Gas Entering the Catalyst Bed

Volumetric Flow Rate at 60 °F and 1 atm (Q_{fi})	= $Q_{tot} \times (519)/(77\ °F + 460)$ =	7,298	scfm
Catalyst Volume (Vol_{cat})	= Q_{fi}/Φ	14.60	ft^3
Estimated inlet temperature to the catalyst bed (T_{fi}) =	(Calculated using Equation 2.28 in Chapter 2 of the Cost Manual)	893	°F

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\,(1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Future Worth Factor

Parameter	Equation	Calculated Value
Future Worth Factor (FWF) =	$i\,[1/(1+i)^y - 1]$ =	0.2303
	Where y = Catalyst Life and i= Interest Rate	

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 x Qtot^(0.5527)) x (2025 CEPI/1999 CEPCI) =	$406,821	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$40,682	
Sales taxes =	0.03 × A =	$12,205	
Freight =	0.05 × A =	$20,341	
	Total Purchased equipment costs (B) =	$480,049	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$38,404	
Handling and Erection =	0.14 × B =	$67,207	
Electrical =	0.04 × B =	$19,202	
Piping =	0.02 × B =	$9,601	
Insulation for Ductwork =	0.01 × B =	$4,800	
Painting =	0.01 × B =	$4,800	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$144,015	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$624,063	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$48,005	
Construction and field expenses =	0.05 × B =	$24,002	
Contractor fees =	0.10 × B =	$48,005	
Start-up =	0.02 × B =	$9,601	
Performance test =	0.01 × B =	$4,800	
	Total Indirect Costs (IC) =	$134,414	
Continency Cost (C) =	CF(IC+DC)=	$113,772	
Total Capital Investment =	**DC + IC +C =**	**$872,248**	**in 2025 dollars**

Direct Annual Costs			
Catalyst Replacement Cost	= 1.08 × CC × Vol_{cat} × FWF Where CC is the $/$ft^3$ cost for the replacement catalyst; Vol_{cat} is the volume of catalyst required based on the waste gas flow rate (Q_{ft}) and the catalyst space velocity (Φ); and FWF is the future worth factor.	$2,360	
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$23,753	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$162,532	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$239,890**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$17,445	
Property Taxes	= 1% of TCI	$8,722	
Insurance	= 1% of TCI	$8,722	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$72,776	
Indirect Annual Costs (IC) =		**$138,413**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$378,304**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$378,304	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	14.0	tons/year
Cost Effectiveness =	$27,101	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Regenerative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	63	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_w) at 77°F and 1 atm.	7,500	scfm	
Pressure drop (ΔP)	19	inches of water	* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	80	°F	
Operating Temperature (T_{fi})	1,900	°F	* Note: Default value for Tfi is 2000°F for thermal regenerative oxidizers. Use actual value if known. Tfi for regenerative oxidizers typically between 1800 and 2000°F.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.
Heat Loss (η)	1	percent*	* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2025				
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	536.4	2016 CEPCI	*Enter dollar year first.
Annual Interest Rate (i)	5.50	%			* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G4Sinterest rate.
Electricity ($Cost_{elect}$)	0.08061	$/kWh			
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf			
Operator Labor Rate	$24.00	per hour			
Maintenance Labor rate	$33.00	per hour			
Contingency Factor (CF)	15.0	Percent			

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
VOC	63	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	63	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair})	(For thermal oxidizers)	0.255	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	63	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	21,000	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.30	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	7,500	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	27.8	kW		
Q_{wo}	= Q_{wi} =	7,500	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	1,900	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	1,354	°F	Note: this temperature is relevant for incinerators, but not for t	
Temperature of flue gas exiting the regenerative oxidizer (T_{fo})	= T_{fi} - 0.95(T_{fi} - T_{wi}) =	171	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum (-\Delta h_{ci})\ x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.15	Btu/scf	2.0	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.45 in Appendix B)	13.55	scfm		
Auxiliary fuel Energy Input =		11,890	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	12,552	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion?	(Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)	No		Note: Additional auxiliary fuel equivalent to 5% of total energy input is required to stabilize combustion.	
Auxiliary fuel flow (Qaf) (adjusted for fuel required for combustion stabilization)at 77°F and 1 atm. =		14	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	7,514	scfm		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\ (1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Regenerative Oxidizer	=(2.204 x 100,000 + 11.57 Qtot) x (2025 CEPI/1999 CEPCI) =	$548,173	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$54,817	
Sales taxes =	0.03 × A =	$16,445	
Freight =	0.05 × A =	$27,409	
	Total Purchased equipment costs (B) =	$646,844	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$51,748	
Handling and Erection =	0.14 × B =	$90,558	
Electrical =	0.04 × B =	$25,874	
Piping =	0.02 × B =	$12,937	
Insulation for Ductwork =	0.01 × B =	$6,468	
Painting =	0.01 × B =	$6,468	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$194,053	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$840,897	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$64,684	
Construction and field expenses =	0.05 × B =	$32,342	
Contractor fees =	0.10 × B =	$64,684	
Start-up =	0.02 × B =	$12,937	
Performance test =	0.01 × B =	$6,468	
	Total Indirect Costs (IC) =	$181,116	
Continency Cost (C) =	CF(IC+DC)=	$153,302	
Total Capital Investment =	**DC + IC +C =**	**$1,175,315**	**in 2025 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$19,622	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$45,872	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$116,740**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$23,506	
Property Taxes	= 1% of TCI	$11,753	
Insurance	= 1% of TCI	$11,753	
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	$98,350	
Indirect Annual Costs (IC) =		**$176,110**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$292,849**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$292,849	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	14.0	tons/year
Cost Effectiveness =	$20,979	per ton of pollutants removed in 2025 dollars

Data Inputs

Select the type of oxidizer: Recuperative Thermal Oxidizer

Enter the following information for your emission source:

Composition of Inlet Gas Stream				
Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
VOC	63	21,000	2,353	44.09

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below. In addition, the heat of combustion to be entered in column D is a lower heating value (LHV), not a higher heating value (HHV).

Enter the design data for the proposed oxidizer:

Number of operating hours/year	8,760	hours/year	
Inlet volumetric flow rate(Q_w) at 77°F and 1 atm.	7,500	scfm	
Pressure drop (ΔP)	19	inches of water	* 19 inches of water is a default pressure drop for thermal oxidizers. User should enter actual value, if known.
Motor/Fan Efficiency (ε)	60	percent*	* 60% is a default fan efficiency. User should enter actual value, if known.
Inlet Waste Gas Temperature (T_{wi})	80	°F	
Operating Temperature (T_{fi})	1,600	°F*	* Note: Default value for Tfi is 1600°F for thermal recuperative oxidizers. Use actual value if known.
Destruction and Removal Efficiency (DRE)	98	percent	
Estimated Equipment Life	20	Years*	* 20 years is the typical equipment life. User should enter actual value, if known.

Percent Energy Recovery (HR) = 70 percent

Enter the cost data:

Desired dollar-year	2025			
CEPCI* for 2025	791.6	Enter the CEPCI value for 2025	390.6	1999 CEPCI
Annual Interest Rate (i)	5.50	%		
Electricity ($Cost_{elect}$)	0.08061	$/kWh		
Natural Gas Fuel Cost ($Cost_{fuel}$)	0.0061	$/scf		
Operator Labor Rate	$24.00	per hour		
Maintenance Labor rate	$33.00	per hour		
Contingency Factor (CF)	15.0	Percent		

*Enter dollar year first.

* The default rate of 5.50% is the current bank prime rate, which is a nominal (or market) G45interest rate.

* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Data Sources for Default Values Used in Calculations:

Parameters for Common Compounds:

Compound	LEL (ppmv)	Heat of Combustion (Btu/scf)	Molecular Weight
Methane*	50,000	911	16.04
Ethane	30,000	1,631	30.07
Propane	21,000	2,353	44.09
Butane	19,000	3,101	58.12
Pentane	14,000	3,709	72.15
Hexane	11,000	4,404	86.17
Octane	10,000	5,796	114.23
Nonane	8,000	6,493	128.25
Decane	8,000	7,190	142.28
Ethylene**	27,000	1,499	28.05
Propylene	20,000	2,182	42.08
Cyclohexane	13,000	4,180	84.16
Benzene**	14,000	3,475	78.11
Toluene**	11,000	4,274	92.14
Methyl Chloride (Chloromethane)**	82,500	705	50.49

Footnotes
* Greenhouse gas.
** Hazardous air pollutant.

Data Element	Default Value	Sources for Default Values used in the calculation . . .	If you used your own site-specific values, please enter the value used and the reference source . . .	Recommended data sources for site-specific information
Electricity Cost ($/kWh)	0.0641	Average annual electricity cost for industrial plants is based on 2016 price data compiled by the U.S. Energy Information Administration from data reported on Form EIA-861 and 861S, (https://www.eia.gov/electricity/annual/html/epa_02_04.html).		Plant's utility bill or use U.S. Energy Information Administration (EIA) data for most recent year. Available at http://www.eia.gov/electricity/data.cfm#sales.
Fuel Cost ($/Mscf)	3.51	Annual average price paid for natural gas by industrial facilities in 2016 from the U.S. Energy Information Administration. Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.		Check with fuel supplier or use U.S. Energy Information Administration (EIA) data for most recent year." Available at http://www.eia.gov/dnav/ng/hist/n3035us3A.htm.
Operator Labor ($/hour)	26.61	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for operators based on data for plant and System Operators – other (51-8099).		Use plant-specific labor rate.
Maintenance Labor ($/hour)	27.40	Bureau of Labor Statistics, May 2016 National Occupational Employment and Wage Estimates – United States, May 2016 (https://www.bls.gov/oes/current/oes_nat.htm). Hourly rates for maintenance workers based on electrical and electronics commercial and industrial equipment repairers (49-2094).		Use plant-specific labor rate.

Design Parameters

The following design parameters for the oxidizer were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Composition of Inlet Gas Stream		
Pollutant Name	Concentration in Waste Stream (ppmv) From Data Inputs Tab	Adjusted Concentration with Dilution Air (ppmv)
VOC	63	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
0	0	NA
Total	63	0

Constants used in calculations:

Temperature of auxiliary fuel (T_{af}) =	Reference Temperature (T_{ref}) =	77.0	°F
Density of auxiliary Fuel at 77 °F (ρ_{af}) =		0.0408	lb/ft^3
Heat Input of auxiliary fuel ($-\Delta h_{caf}$) =		21,502	Btu/lb
Density of waste gas at 77 °F (ρ_{wi}) =		0.0739	lb/ft^3
Mean Heat Capacity of Air (C_{pmair})	(For thermal oxidizers)	0.255	Btu/lb °F

Parameter	Equation	Calculated Value	Units	Value	Units
Sum of volume fraction of combustible components =	= ($\sum x_i$) =	63	ppmv		
Lower Explosive Limit of waste gas (LEL_{mix})	= $[\sum((x_j)/((\sum x_i) \times LEL_j))]^{-1}$ =	21,000	ppmv		
	Where x_j is the volume fraction and LEL_j the lower explosive limit for each combustible component in the waste gas.				
% LEL_{mix}	= (Total Combustible Conc. In Mixture/LEL_{mix}) × 100 =	0.30	percent	* Note: Since the LEL of the waste gas stream is below 25%, no dilution air is needed.	
Dilution Factor	= (LEL_{mix} x 0.249)/($\sum x_i$) =	Not applicable			
Lower Explosive Limit (LEL) of waste gas after addition of dilution air	= (Total Adjusted Conc. With Dilution Air/LEL_{mix}) × 100 =	Not Applicable			
Inlet volumetric flow rate(Qwi) at 77°F and 1 atm.	(From Data Entry Tab) =	7,500	scfm		
Oxygen Content of gas stream	= 100 - ($\sum x_j \times 100/10^6$) =	20.90	percent		
Fan Power Consumption (FP)	= $[(1.17 \times 10^{-4}) \times Q_{wi} \times \Delta P]/\varepsilon$	27.8	kW		
Q_{wo}	= Q_{wi} =	7,500	scfm		
Operating temperature of oxidizer (T_{fi})	(From Data Entry Tab)	1,600	°F		
Temperature of waste gas at outlet to preheater (T_{wo})	= Heat Recovery × (T_{fi} - T_{wi}) + T_{wi} =	1,144	°F	Note: this temperature is relevant for incinerators, but not for th	
Temperature of flue gas exiting the oxidizer (T_{fo})	= T_{fi} - T_{wo} + T_{wi} =	536	°F		
Heat Input of waste gas ($-\Delta h_{cwi}$)					
	= $\sum(-\Delta h_{ci})\ x_i$				
	Where ($-\Delta h_{ci}$) is the heat of combustion and x_i the fraction of component "i" at 77 °F.	0.15	Btu/scf	2.0	Btu/lb
Estimated Auxiliary Fuel Flow (Q_{af}) at 77 °F and 1 atm.	(Calculated using Equation 2.21 in Chapter 2 of the Cost Manual)	98.69	scfm		
Auxiliary fuel Energy Input =		86,575	Btu/min		
Minimum Energy required for combustion stabilization =	= 5% × Total Energy Input = 0.05 × $\rho_{fi} \times Q_{fi} \times C_{pmfi} \times (T_{fi} - T_{ref})$ =	10,605	Btu/min		
Is the calculated auxiliary fuel sufficient to stabilize combustion?	(Note: If the auxiliary fuel energy input > 5% of Total Energy Input, then the auxilary fuel is sufficient.)	Yes			
Auxiliary fuel flow (Qaf) at 77°F and 1 atm. =		99	scfm		
Total Volumetric Throughput (Q_{tot}) at 77 °F and 1 atm.	= $Q_{fi} = Q_{wo} + Q_a + Q_{af} = Q_{wi} + Q_{af}$ =	7,599	scfm		

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	$i\ (1+i)^n/(1+i)^n - 1$ =	0.0837
	Where n = Equipment Life and i= Interest Rate	

Cost Estimate

Direct Costs			
Total Purchased equipment costs (in 2025 dollars)			
Incinerator + auxiliary equipment[a] (A) =			
Equipment Costs (EC) for Recuperative Thermal Oxidizer	= (21,342 x Qtot(0.25)) x (2025 CEPI/1999 CEPCI) =	$403,825	in 2025 dollars
Instrumentation[b] =	0.10 × A =	$40,383	
Sales taxes =	0.03 × A =	$12,115	
Freight =	0.05 × A =	$20,191	
	Total Purchased equipment costs (B) =	$476,514	in 2025 dollars

Footnotes
a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2025 dollars)			
Foundations and Supports =	0.08 × B =	$38,121	
Handling and Erection =	0.14 × B =	$66,712	
Electrical =	0.04 × B =	$19,061	
Piping =	0.02 × B =	$9,530	
Insulation for Ductwork =	0.01 × B =	$4,765	
Painting =	0.01 × B =	$4,765	
Site Preparation (SP) =		$0	
Buildings (Bldg) =		$0	
	Total Direct Installaton Costs =	$142,954	
Total Direct Costs (DC) =	B + C + SP + Bldg =	$619,468	in 2025 dollars

Total Indirect Installation Costs (in 2025 dollars)			
Engineering =	0.10 × B =	$47,651	
Construction and field expenses =	0.05 × B =	$23,826	
Contractor fees =	0.10 × B =	$47,651	
Start-up =	0.02 × B =	$9,530	
Performance test =	0.01 × B =	$4,765	
	Total Indirect Costs (IC) =	$133,424	
Continency Cost (C) =	CF(IC+DC)=	$112,934	
Total Capital Investment =	**DC + IC +C =**	**$865,825**	**in 2025 dollars**

Direct Annual Costs			
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	$19,622	
Annual Fuel Costs for Natural Gas	= $Cost_{fuel}$ × Fuel Usage Rate × 60 min/hr × Operating hours/year	$316,403	
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	$13,140	
	Supervisor = 15% of Operator	$1,971	
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	$18,068	
	Materials = 100% of maintenance labor	$18,068	
Direct Annual Costs (DC) =		**$387,271**	**in 2025 dollars**

Indirect Annual Costs			
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	$30,748	
Administrative Charges	= 2% of TCI	$17,317	
Property Taxes	= 1% of TCI	$8,658	
Insurance	= 1% of TCI	$8,658	
Capital Recovery	= CRF x TCI	$72,452	
Indirect Annual Costs (IC) =		**$137,832**	**in 2025 dollars**
Total Annual Cost =	**DC + IC =**	**$525,103**	**in 2025 dollars**

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	$525,103	per year in 2025 dollars
VOC/HAP Pollutants Destroyed =	14.0	tons/year
Cost Effectiveness =	$37,618	per ton of pollutants removed in 2025 dollars

Appendix O
Coating - VOC Control Option Supporting Data

5.5.2.3 Control Assessment for the Coating Operations

Since the original permit application submittal, Fritz Winter has identified a U.S. manufactured and supplied coating that contained less xylene (4% rather than 6%) that will be used in the parts coating operation. However, the new formulation does result in a slightly higher VOC content. Refer to EXHIBIT E for the new Safety Data Sheets (SDS). Based on the latest production schedule Fritz Winter anticipates that peak production for Phase 1 equipment will be reached in 2019, with uncontrolled VOC emissions from the coating operations peaking at 16.1 TPY. Peak production for Phase 2 equipment will be reached in 2022, with uncontrolled VOC emissions from the coating operations peaking at 26 TPY and uncontrolled xylene emissions peaking at 5.4 TPY. A separate BACT cost effectiveness calculation has been completed for both Phase 1 and Phase 2 production.

Since the original permit application submittal, Fritz Winter has contacted numerous vendors of pollution control devices to obtain quotes for installation of a carbon adsorption/ regeneration system that DAQ determined to represent BACT in the current permit. Most vendors contacted did not offer onsite regeneration units or considered the relatively small amount of VOC emitted did not warrant a carbon regeneration system especially considering there is no way to recover or reuse the VOC in the process. They encouraged more cost effective control technologies. The vendors stated that onsite regeneration of activated carbon is viable only when the quantities of VOC are much greater and when the recoverable material is intended for re-used in the process. Fritz Winter did obtain cost estimates from two vendors for a regenerative carbon adsorption system as well as two quotes from vendors of RTOs for comparison. The actual vendor communications are provided in EXHIBIT H.

Evaluation of the traditional EPA BACT cost effectiveness calculation spreadsheet for a carbon adsorption system with actual vendor quotes, indicated that the cost of a carbon adsorption system is higher than the EPA spreadsheet used for the original permit application would indicate. Evaluation of the traditional EPA BACT cost effectiveness calculation spreadsheet for an RTO with actual vendor quotes indicated that the cost of an RTO is lower than the EPA spreadsheets appear to indicate. The lowest cost of the two vendor quotes was then inserted into the cost effectiveness calculations and the new cost effective results are provided in Table 5-3.

Table 5-3: Revised Cost Effectiveness Results with Vendor Quotes

Control Device	Original Application	Cost Effectiveness $/ton	
		End of Phase Construction	Revised Cost
Biofilter	$11,029	Phase 1	$43,385
		Phase 2	$26,866
Activated Carbon with Regeneration	$27,123	Phase 1	$47,410
		Phase 2	$29,357
Regenerative Thermal Oxidizer (RTO)	$27,609	Phase 1	$23,788
		Phase 2	$14,731

The revised cost effectiveness spreadsheet for a Biofilter is presented in Table 5-4a. The revised cost effectiveness spreadsheet for an n Activated Carbon unit with Regeneration is presented in Table 5-4b. The revised cost effectiveness spreadsheet for an RTO is presented in Table 5-4c. The results show that none of the control technologies are cost effective.

TABLE 5-4a Cost Effectiveness Evaluation for a Biofilter on the Coating Operation

TOTAL ANNUAL COST SPREADSHEET PROGRAM--BIOFILTER
Fritz Winter Paint Spray Booths Cost Effectiveness Calculation

Cost or Process Item	Data	Basis for Estimate
CPI Base Year (1998):	1,000	
CPI (2016):	1,474	Adjustment of captical cost for inflation per Consumer Price Index
INPUT PARAMETERS		
-- Gas flowrate (scfm):	17,425	Waste gas flow of 275,500 acfm @ 132 F reduced to standard conditons
-- Reference temperature (oF):	68	Standard temperature in Fahrenheight
-- Inlet gas temperature (oF):	93	Outlet exhaust temperature from booth
-- Inlet gas density (lb/scf):	0.0752	Density of air at standard conditions
TOTAL CAPITAL INVESTMENT ($)	502,662	Based on Correlation with SCFM presented in "Biofiltration of Ethanol Emissions from Bakery Operations" 99-371 Govind, Fangl and Melarkode
'Escalated to current dollars:	740,924	Cost in current dollars adjust by CPI
Annual interest rate (fraction):	0.06	Current average interest rate on working capital (SBA 6 to 7%)
Control system life (years):	10	Typical life of process equipment in this service
Capital recovery factor:	0.1359	Calculated from interest rate and life cycle
Taxes, insurance, admin. factor:	0.040	Typical additional cost factor for capital projects
Pressure drop (in. w.c.):	20	
ANNUAL COSTS		
Item	Cost ($/yr)	
Operating Cost including power,media replacer	302768	Based on Correlation with SCFM presented in "Biofiltration of Ethanol Emissions from Bakery Operations" 99-371 Govind, Fangl and Melarkode
Taxes, insurance, administrative	29,637	Standard tax and insurance rates
Capital recovery	100,668	Capital recovery based on above stated interest rate and life cycle
Total Annual Cost	433,073	Total Annual cost
Cost Effectiveness Assessment		
VOC Inlet	16.1	Total VOC emitted at maximum production after Phase 1
DRE	62%	Estimated DRE for RTO operation
VOC Removed	10.0	Total VOC Destruction Phase 1
Cost Effectiveness	**43,385 $/ton**	Cost Effectiveness $/ton (after Phase 1)
VOC Inlet	26.0	Total VOC emitted at maximum production after Phase 2
DRE	62%	Estimated DRE for RTO operation
VOC Removed	16.1	Total VOC Destruction Phase 2
Cost Effectiveness	**26,866 $/ton**	Cost Effectiveness $/ton (after Phase 2)

TABLE 5-4b Cost Effectiveness Evaluation for an Activated Carbon with Regeneration on the Coating Operation (revised)

TOTAL ANNUAL COST SPREADSHEET PROGRAM--CARBON ADSORPTION w/REGENERATION
Fritz Winter Paint Spray Booths Cost Effectiveness Calculation

Cost or Process Item	Data	Basis for Estimate
CPI Base Year (2016):	1,000	
CPI (2016):	1,000	Adjustment of captical cost for inflation per Consumer Price Index
INPUT PARAMETERS:		
-- Inlet stream flowrate (acfm):	18,250	Estimated actual air flow out of the coating booths
-- Inlet stream temperature (oF):	93	Estimated temperaterature leaving the booth
-- Inlet stream pressure (atm):	1	System is not under pressure or vacuum
-- VOC to be oxidized:	100%	No VOC can be recovered during desorption all oxidized
-- Inlet VOC flowrate (lb/hr):	5.78	Average hourly emissions of VOC
-- VOC molecular weight (lb/lb-mole):	106.00	Molecular weight of Xylene the primary component
-- VOC inlet volume fraction:	2.01E-05	Calculated from above lb moles of xylene/ lb moles of air
-- VOC inlet concentration (ppmv):	20	mole fraction in ppm form
-- VOC inlet partial pressure (psia):	0.00030	mole fraction in partial pressure form
-- Required VOC removal (fraction):	0.9	Highly adsorptive compounds such as xylene and C9 aromatics comprise only 80% of the total mixture remainder are much lower adsorption capacity
-- Freundlich isotherm equation constants for VOC (see Table 1 below):		
VOC number (enter Table 1 # or zero, if no data):	1,008	Freundlich Isotherm parameters for Xylene
K:	0.708	
M:	0.113	
-- Yaws isotherm equation constants (see Table 2 below):		
VOC number (enter Table 2 #or zero, if no data):	533	Yaw Isotherm parameters for Xylene
A:	1.31522	
B:	0.14019	
C:	-0.01457	
-- Adsorption time (hr):	168.0	Assumes one adsorber operates through entire week of operation
-- Desorption time (hr):	24.0	Time to prepare adsorber by heating to desorb and burning the vent gases
-- Number of adsorbing vessels:	2	Allows for a spare adsorber to come on line after breakthrough
-- Superficial carbon bed velocity (ft/min):	75	Average design value for adsorbers - gas velocity at cross sectional area
-- Carbon price ($/lb):	2.00	Current cost of carbon
-- Material of construction (see list below):[4]	1	Stainless steel (316) construction - corrosion resistant
DESIGN PARAMETERS:		
-- Carbon equilibrium capacity--Freundlich (lb VOC/lb carb):	0.2826	Determined from Freunlich Isotherm
" " " -- Yaws et al " " " "	0.2973	Determined from Yaws isotherm
-- Carbon working capacity (lb VOC/lb carbon):	0.14	Half of minimum theoretical equilibriam capacity since regenerated carbon does not return to virgin capacity
-- Number of desorbing vessels:	1	
-- Total number of vessels:	3	Allows 2 adsorbers in operation at all times to prevent breakthrough
-- Carbon requirement, total (lb):	10308	
-- Carbon requirement per vessel (lb):	3436	
-- Gas flowrate per vessel (acfm):	18250	Two adsorbers in series both treating total air flow
-- Adsorber vessel diameter (ft):	17.602	
-- Adsorber vessel length (ft):	4.471	
-- Adsorber vessel surface area (ft2):	733.88	
-- Carbon bed thickness (ft):	0.471	
-- Carbon bed pressure drop (in. w.c.): [5]	1.592	
CAPITAL COSTS		
Equipment Costs ($):		
Direct Captial Costs (DC)		
Purchased Equiment Costs (PE)		
Carbon Ad & Instrumentation	$550,000.00	Vendor Quote
Instrumentation	55,000	Cost Manual states 10% of equipment cost includes instrumentation to incorporate into the plant digital operating system
Ductwork	$32,000.00	
Sales Taxes	$33,000.00	6% (Sales tax in Texas which is the location of one of the vendors)
Freight	$27,500.00	5% of Equipment per Cost Manual
PE Total:	$697,500.00	Sum
Direct Installation Costs (DI):	$209,250.00	30% of PE per Cost Manual
DC Total:	$906,750.00	Sum of PE + DI
Indirect Capital Costs (IC)		
IC Total:	$216,225.00	31% of PE per Cost Manual
Total Capital Investment (TCI)	**$1,122,975.00**	Sum of DC and IC
Adsorber vessels/boiler & incinerator	1,122,975	Vendor quote for cost of 3 SS adsorbers and boiler/incinerator adjusted for direct and indirect costs
-- Carbon	20,615	Initial carbon cost does not allow for any losses
-- Other equipment (fan, duct work cooling, etc.)	0	
Total equipment cost ($)--base:	1,804,868	Total cost based on a regression analysis on treated exhaust volume
" " " --escalated:	1,804,868	Escalated cost over 1999 dollars
Gas Fired Boiler	25,000	There is no boiler intended to be on site so this is a small 1,000 lb/hr gas fired low pressure boiler
Small Oxidizer (200 cfm)	0	The cost of a small straight through gas fired oxidizer
Total Adsorption equipment and support equipment	1,829,868	
Purchased Equipment Cost ($):	1,976,258	Includes cost of taxes and freight
Total Capital Investment ($):	3,181,775	Allows for direct and indirect cost of installation of equipment see EPA/452/B-02-001 Table 1.5
" " " ($/acfm):	174.3	

TABLE 5-4b Cost Effectiveness Evaluation for an Activated Carbon with Regeneration on the Coating Operation – continued

ANNUAL COSTS: Item	Cost ($/yr)	
Operating labor	18,615	Based on rates listed above and hours of operator time
Supervisory labor	2,792	Standard overhead labor rates
Maintenance labor	18,615	Based on rates listed above and hours of operator time
Maintenance materials	18,615	Assumes parts cost equals labor
Electricity	4,554	Power factors listed in EPA/452/B-02-001 Page 1-35
Steam	1,063	Based on rates listed above and hours of desorption
Gas Usage	1,806	Assuming 200 cfm air purge through adsorber during desorption and gas used to elevate temp to 1400 F
Carbon replacement	8,680	Carbon life listed above and cost to replace
Overhead	35,182	Standard labor overhead factors for above
Taxes, insurance, administrative	127,271	Standard tax and insurance rates
Capital recovery	449,770	Capital recovery based on above stated interest rate and life cycle
Total Annual Cost	**$ 686,964**	Total Annual cost
Cost Effectiveness Assessment		
VOC Inlet	16.1	Total VOC emitted at maximum production after Phase 1
DRE	90%	Estimated DRE for carbon/incinerator operation
VOC Removed	14.5	Total VOC Destruction Phase 1
Cost Effectiveness	**47,410 $/ton**	Cost Effectiveness $/ton (after Phase 1)
VOC Inlet	26.0	Total VOC emitted at maximum production after Phase 2
DRE	90%	Estimated DRE for carbon/incinerator operation
VOC Removed	23.4	Total VOC Destruction Phase 2
Cost Effectiveness	**29,357 $/ton**	Cost Effectiveness $/ton (after Phase 2)

TABLE 5-4c Cost Effectiveness Evaluation for an RTO on the Coating Operation (revised)

TOTAL ANNUAL COST SPREADSHEET PROGRAM--REGENERATIVE THERMAL OXIDIZERS
Fritz Winter Paint Spray Booths Cost Effectiveness Calculation

Cost or Process Item		Data		Basis for Estimate
CPI Base Year (2016):		1,000		
CPI (2016):		1,000		Adjustment of captical cost for inflation per Consumer Price Index
	INPUT PARAMETERS			
-- Gas flowrate (scfm):		17,425		Waste gas flow of 18,250 acfm @ 93 F reduced to standard conditons
-- Reference temperature (oF):		68		Standard temperature in Fahrenheight
-- Inlet gas temperature (oF):		93		Outlet exhaust temperature from booth
-- Inlet gas density (lb/scf):		0.0752		Density of air at standard conditions
-- Primary heat recovery (fraction):		0.95		Assumed heat recovery efficiency for standard RTO
-- Waste gas heat content (BTU/scf):		0.105		VOC emission rate of 5.93 lb/hr and heat of combustion 18,600 BTU/lb divided by exhaust flow
-- Waste gas heat content (BTU/lb):		1.40		Calculate heat content based on mass of air leaving
-- Gas heat capacity (BTU/lb-oF):		0.255		Approximate heat capacity of air at exhaust gas conditions
-- Combustion temperature (oF):		1,400		Assumed combustion temperature to achieve combustion
-- Heat loss (fraction):		0.01		Heat loss from equipment
-- Exit temperature (oF):		158		Calculated exhaust gas temperature based on 95% thermal efficiency of the RTO
-- Fuel heat of combustion (BTU/lb):		20,083		Natural gas heat of combustion combustion (net)
-- Fuel density (lb/ft3):		0.0434		Density of Natural gas at standard conditions 96% methane 4% air
	DESIGN PARAMETERS			
Auxiliary Fuel Requirement (lb/min):		1.043		Revised to vendor expected usage of 1.257 mmBTU/hr
	(scfm):	24.0		maximum natural gas usage in scfm
Total Gas Flowrate (scfm):		17,449		Total exhaust gas flow including combustion air and fuel in scfm
Direct Captial Costs (DC)				
Purchased Equiment Costs (PE)				
	RTO & Integral Hardware	$425,000.00		Vendor Quote
	Interface Instrumentation	$42,500.00		Cost Manual states 10% of equipment cost includes instrumentation to incorporate into the plant digital operating system
	Ductwork	$32,000.00		
	Sales Taxes	$25,500.00		6% (Sales tax in Texas which is the location of one of the vendors)
	Freight	$21,250.00		5% of Equipment per Cost Manual
	PE Total:	$546,250.00		Sum
Direct Installation Costs (DI):		$163,875.00		30% of PE per Cost Manual
DC Total:		$710,125.00		Sum of PE + DI
Indirect Capital Costs (IC)				
IC Total:		$169,337.50		31% of PE per Cost Manual
Total Capital Investment (TCI)		**$879,462.50**		Sum of DC and IC
	@ 95 % heat recovery--base:		$ 879,463	Capital cost of RTO vendor quote (Gulf Coast Systems) as basis with a factored estimate of Direct & Indirect costs
	' ' ' --escalated:		$ 879,463	Cost in current dollars adjust by CPI
	ANNUAL COST INPUTS			
Operating factor (hr/yr):		8,760		Operating hours for the plant
Operating labor rate ($/hr):		34		Going Labor rate
Maintenance labor rate ($/hr):		34		Going Labor rate
Operating labor factor (hr/sh):		0.50		Time operator spends checking on RTO per shift per cost manual
Maintenance labor factor (hr/wk):		11		Overall average maintenance time on unit
Electricity price ($/kwh):		0.06925		Average commercial power rate in Kentucky from US Energy Information System
Natural gas price ($/mscf):		5.30250		Average cost of natural gas in Kentucky from US Energy Information System
Annual interest rate (fraction):		0.06		Current average interest rate on working capital (SBA 6 to 7%)
Control system life (years):		10		Typical life of process equipment in this service
Capital recovery factor:		0.1359		Calculated from interest rate and life cycle
Taxes, insurance, admin. factor:		0.040		Typical additional cost factor for capital projects
Pressure drop (in. w.c.):		20		
	ANNUAL COSTS			
Item		Cost ($/yr)		
Operating labor		18,615		Based on rates listed above and hours of operator time
Supervisory labor		2,792		Standard overhead labor rates
Maintenance labor		18,564		Based on rates listed above and hours of operator time
Maintenance materials		18,564		Assumes parts cost equals labor
Natural gas		66,989		Natural gas usage times cost per unit above
Electricity		48,530		Power usage based on vendor expected usage of 80 kw
Overhead		35,121		Standard labor overhead factors for above
Taxes, insurance, administrative		35,179		Standard tax and insurance rates
Capital recovery		119,491		Capital recovery based on above stated interest rate and life cycle
Total Annual Cost		**$ 363,845**		**Total Annual cost**
Cost Effectiveness Assessment				
VOC Inlet		16.1		Total VOC emitted at maximum production after Phase 1
DRE		95%		Estimated DRE for RTO operation
VOC Removed		15.3		Total VOC Destruction Phase 1
Cost Effectiveness		**23,788**	**$/ton**	Cost Effectiveness $/ton (after Phase 1)
VOC Inlet		26.0		Total VOC emitted at maximum production after Phase 2
DRE		95%		Estimated DRE for RTO operation
VOC Removed		24.7		Total VOC Destruction Phase 2
Cost Effectiveness		**14,731**	**$/ton**	Cost Effectiveness $/ton (after Phase 2)

For BACT comparison, Fritz Winter reviewed permits from similar facilities that practiced surface coating of iron cast parts, and identified three foundries. Their permits are provided in EXHIBIT H. Table 5-5 provides a list of the three facilities recently permitted that practice surface coating of iron cast parts. The agency issued permits for all three facilities do not require any kind of VOC treatment of emissions.

Table 5-5: Permit Requirements of Comparable Surface Coating Units at Iron Foundries

Iron Foundry	VOC Emissions	Permit Requirement
NIBCO Blytheville, AR	31 TPY	Filters on spray booths - no VOC controls
Asama Coldwater, MI	30 TPY	Filters on spray booths - no VOC controls
Brembo Homer, MI	43.5 TPY	Filters on spray booths - no VOC controls

5.5.3 SELECTION OF BACT SUMMARY FOR ALL THREE APPLICATIONS

For all three VOC generating operations Fritz Winter proposes a work practice for VOC BACT. Fritz Winter proposes a work practice for control of VOC from the PCS process by practicing and ensuring mold vent autoignition. The molds will be continuously observed by television monitors to ensure that the molds are autoigniting and the small burners are aimed appropriately so they will ignite any mold not already burning.

A work practice for the core shop is to ensure the pH of the sulfuric acid scrubber is maintained below a pH of 4.5 to ensure that amine is absorbed. As well as keep any unused resin containers closed.

A work practice proposed for the coating operation is to ensure any unused paint or solvent containers are covered at all times and the VOC content of the paint does not exceed 15%.

AMEC Foster Wheeler
Kentucky Auto Supplier
Paint Booth Exhaust

Gulf Coast Environmental Systems

GCES ABATEMENT EQUIPMENT COMPARISON COST OF OWNERSHIP

	GCES Thermal Oxidizer	GCES Regenerative Thermal Oxidizer (2-Canister)	GCES Deep Bed Regenerative Carbon System with RTO		Used Regenerative Thermal Oxidizer (2-Canister) - Refurbished
System Proposed	New	New	New		Refurbished
Oxidizer System Type	Thermal Oxidizer (TO)	Regenerative Thermal Oxidizer (RTO)	Deep Bed Regenerative Carbon / RTO		Regenerative Thermal Oxidizer (RTO)
Assumed VOC Loading Heat Release (btu/hr)	**67,500**	**67,500**	**67,500**		**67,500**
Maximum Capacity (SCFM)	**17,500**	**17,500**	**17,500**		**20,000**
Operating Air Flow (SCFM) - 100% of Plant Capacity	17,500	17,500	17,500		17,500
Operating Inlet Temperature (F)	**93**	**93**	**93**		**93**
Operating Process Vapor Inlet Pressure (in. w.c.)	0	0	0		0
Expected Operating Temperature (F)	1,400	1,400	93		1,400
Maximum Operating Temperature (F)	1,800	1,800	1,800	RTO Unit	1,800
Destruction Efficiency Guaranteed (% or less than 20 ppmv)	**95.0%**	**95.0%**	**95.0%**		**95.0%**
Heat Recovery Type	N/A	Structured Media	N/A		Structured Media
Expected Thermal Efficiency (%)	0%	95%	0%		95%

	In U.S. Dollars
Assumed Natural Gas Cost ($/mm btu)	**$5.00**
Assumed Electricity Cost ($/kW)	**$0.080**
Assumed Operating Hours Per Year	**6,000**

Provided BUDGETARY Equipment Price - EXW Conroe, TX					
Delivery, Installation, & Commissioning Separate					
Ductwork, Utility Supply, and Foundation not included	**$300,000**	**$425,000**	**$550,000**		**$300,000**
Approx. Lead Time to Shipment from Order & Initial Payment	**16 weeks**	**16 weeks**	**16 weeks**		**12 Weeks**
1st YEAR:					
Natural Gas Usage - btu/hr	*35,875,000*	*1,256,697*	*1,100,000*	For Steam & RTO	*1,229,394*
Projected Natural Gas Cost - 1 year	**$1,076,250**	**$37,701**	**$33,000**		**$36,882**
Electrical Usage - kW	*55*	*80*	*115*		*75*
Projected Electrical Cost - 1 year	**$26,400**	**$38,400**	**$55,200**		**$36,000**
Operation & Maintenance - 1 year	**$5,000**	**$7,500**	**$15,000**		**$7,500**
Cost of Ownership After 1 year (per year)	**$1,407,650**	**$508,601**	**$653,200**		**$380,382**
TWO YEARS:					
Projected Natural Gas Cost - 2 years	**$2,152,500**	**$75,402**	**$66,000**		**$73,764**
Projected Electrical Cost - 2 years	**$52,800**	**$76,800**	**$110,400**		**$72,000**
Operation & Maintenance - 2 years	**$10,000**	**$15,000**	**$30,000**		**$15,000**
Cost of Ownership After 2 years (per year)	**$1,257,650**	**$296,101**	**$378,200**		**$230,382**
FIVE YEARS:					
Projected Natural Gas Cost - 5 years	**$5,381,250**	**$188,505**	**$165,000**		**$184,409**
Projected Electrical Cost - 5 years	**$132,000**	**$192,000**	**$276,000**		**$180,000**
Operation & Maintenance - 5 years	**$25,000**	**$37,500**	**$75,000**		**$37,500**
Cost of Ownership After 5 years (per year)	**$1,167,650**	**$168,601**	**$213,200**		**$140,382**
TEN YEARS:					
Projected Natural Gas Cost - 10 years	**$10,762,500**	**$377,009**	**$330,000**		**$368,818**
Projected Electrical Cost - 10 years	**$264,000**	**$384,000**	**$552,000**		**$360,000**
Operation & Maintenance - 10 years	**$50,000**	**$75,000**	**$150,000**		**$75,000**
Cost of Ownership After 10 years (per year)	**$1,137,650**	**$126,101**	**$158,200**		**$110,382**

CHART ASSUMES CONSTANT PRICING (I.E. NO INFLATION) & CONSTANT VALUE UTILITY UNIT COSTS

CONFIDENTIAL INFORMATION FOR INTENDED RECIPIENT ONLY

Mueller, Gerald R

From: Sengupta, Utpal (Paul) <PSengupta@megtec.com>
Sent: Tuesday, November 08, 2016 11:44 AM
To: Mueller, Gerald R
Cc: Vandenberg, Robert
Subject: RE: Regenerative Carbon Adsorption

Hello Gerald

It was good to talk to you yesterday. As I mentioned to you, and assuming your client wants a long term solution, RTO may be the way to go here. I have copied my colleague, Mr. Robert Vandenberg who can help you with RTO pricing. Robert's contact information is:

Robert Vandenberg
Regional Sales Manager
Babcock & Wilcox MEGTEC
Direct: (920)-337-1489
Mobile: (920)-360-1105
rvandenberg@megtec.com

Carbon Adsorption Technology is technically viable here and given below are some rough order of magnitude numbers for both a **non-regenerable carbon adsorption system** (where the carbon is taken out of the system and replaced on an on-going basis) and an **onsite steam regenerable carbon adsorption system** you can use to see if this is economically viable or not. Feel free to modify the numbers as you see appropriate.

Design Basis

Air Flow: 18,250 CFM
Temperature: 93 degree F
VOC/Solvent Loading: 4.5 lbs/hour of mainly xylenes with some butyl acetate and ethyl benzenes

Non Regenerable Carbon Adsorption System

Capital Costs
Equipment Cost (blower, adsorber, carbon, controls, interconnecting ductwork and stack): ~ $300,000.00
Installation Cost (say an additional 50% of Equipment Cost): ~ $150,000.00

Operating Costs
Power: ~ 50kW or 1200 kwH/day or **$ 90 /day** based on $0.075/kwH cost.
Carbon Replacement: **$ 900.00 per day** based on ~30 wt% capacity of VOCs on carbon and $2.50 per lb carbon replacement cost.
Labor and Maintenance: Minimal

Steam Regenerable Carbon Adsorption System

Capital Costs
Equipment Cost: ~ $1,500,000.00
Installation Cost (based on additional 50% of equipment cost): $750,000.00

Operating Costs

Power: Similar to above say **$120.00/day**
Steam: Minimal say **$ 5.50/day** (based on cost of steam of $10/1000 lbs)
Labor and Maintenance: say **$50,000 per year**

I hope this information is helpful.

Best Regards,

Paul Sengupta, Solvent Recovery Division
Babcock and Wilcox MEGTEC
1201 19th Place Suite B-301
Vero Beach, FL 322960
T: 772 567 1320 (Office)
www.megtec.com

LEADING IN PRODUCTION EFFICIENCY

AMEC Foster Wheeler, Kentucky US04-83177

Dürr Systems, Inc.
Clean Technology Systems
26801 Northwestern Highway
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USA

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Dürr Systems, Inc. • Southfield, Michigan

AMEC Foster Wheeler
Gerald Mueller
1075 Big Shanty Road, Suite 100
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Our reference:	US04-83177
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E-mail:	david.tyksinski @durrusa.com
Date:	12/1/16

Subject: Dürr Systems, Inc. Budgetary Proposal No. US04-83177

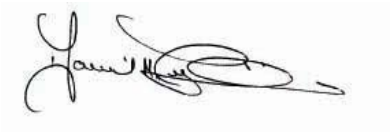
Dear Mr. Mueller:

Dürr Systems, Inc. is pleased to offer this budgetary proposal to supply an **Ecopure**® RL Regenerative Thermal Oxidizer (RTO) and Filter Box system to treat the VOCs from your process exhaust. The choice of the RL unit from our range of control technology options is based on an analysis of your actual process conditions, utility costs and space considerations:

- Limited space: The RL offers the lowest footprint of any RTO on the market and will fit within your designated area.
- Limited installation window: The Dürr **Ecopure**® RL is a unique pre-assembled modular RTO designed for easy installation.
- Ease of operation and low maintenance: The RL uses a single rotary valve with machined seats and air seals instead of multiple inlet, outlet and purge dampers.

We invite you to visit our fabrication facilities or a local site to see the benefits of this unit first hand. Please contact me to arrange a site visit or if you require additional information.

Best regards,
Dürr Systems, Inc.



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This proposal contains confidential and proprietary information of Dürr Systems, Inc. (CTS) and is not to be disclosed to any third parties without the express prior written consent of Dürr Systems. This proposal is submitted solely for the purpose of enabling the client to evaluate Dürr Systems bid on the project within and shall be returned to Dürr or destroyed if so requested by Dürr Systems, Inc.

1 Executive summary

We completed a full technical review of the process and source parameters sent with your request for quotation. We have determined that the use of a concentrator system is not recommended due to the amount of particulate/dust in the source air stream.

For this reason we have elected to propose a stand-alone filter house and RL thermal oxidizer system for abating the process air stream.

The enclosed proposal details a complete engineered thermal oxidizer system designed to abate VOC-contaminated exhaust air from your Foundry painting process. The proposed system will utilize a new Dürr RL rotary valve regenerative thermal oxidizer (RTO) to provide a robust, proven system that will achieve an overall system efficiency of 99% VOC destruction while providing up to 95% thermal efficiency.

Our proposal is based on your design inputs of flow, temperature, static pressure, VOC loading and VOC composition. Dürr would like to highlight some of the advantages that the RL design offers:

- ***Lower Inlet Pressure Fluctuations:*** Since the RL has 12 segmented beds (5 inlet and 5 outlet at any time) and only switches the direction of 20% of the air at each valve index, the RL generates < 12% variance from the inlet static pressure set-point, for a typical pressure fluctuation at the process of +/– 0.1 spwg .

- ***Lower Operating Costs:*** The RL typically operates at a lower combustion temperature set point than two-tower technology. A 2 bed system must run a long cycle time in order to achieve high DRE (> 98%). This extended cycle time results in a large variation in bed-preheat temperature entering the combustion chamber, which increases burner output cycling and gas usage. Since the RL only switches a small fraction of air during each index there is a shorter regeneration period and a smoother CC temp curve. This allows the RL to operate at a lower CC temperature, resulting in lower operating costs and reduced thermal shock to the heat recovery media.

- ***Greater Destruction Efficiency:*** The Dürr RL will easily achieve 99% DRE due to the integral flush system and valve air seal. It is difficult for a two-tower system to achieve >98 DRE. Achieving >98 DRE may require the addition of a 'puff chamber' and/or further extending the valve cycle time. If the puff chamber is used, additional volume and pressure fluctuations are introduced to the system resulting in additional operating costs. If the valve timing is extended to attain dRe, the thermal efficiency is sacrificed. In addition, if a lower destruction efficiency is required, the RL can operate at a lower combustion chamber temperature, resulting in lower operation costs.

- ***Less maintenance:*** The rotary valve in the Dürr RL is supported by a constant pressure air spring which creates a continuous seal against the stator as the valve advances. A typical two-tower system utilizes multiple inlet and outlet valves and actuators that need to be maintained. Competitive two-tower type rotary valve systems require pneumatic cylinders to actuate the valve. The constant motion of the pneumatic cylinder wears the center drive shaft prematurely. Additionally, the lip seals of the pneumatic cylinder require replacement yearly. Dürr has many installations with proven uptime in excess of 99%. The cost of downtime should never be overlooked in the purchase of any RTO.

Please click **HERE** to view a video about RL operation and installation.

1.1 Why Dürr?

Dürr is the one and only company for your environmental and energy solutions, from the initial planning stages to decades after the RL has been installed. We conduct the necessary engineering studies and analyses to ensure the right equipment design for your company's compliance needs.

Dürr is a worldwide company operating in 28 countries. The North American office is strategically located in Southfield, Michigan in a 226,745 ft^2 facility that is QS-9000/TE certified.

Dürr skills, strength and resources are that:

- We are the air pollution technology leader with the widest range of technology options available to solve your specific application and compliance issues.
- With over four decades of experience, Dürr will apply the proper application and complete integration of available technology.
- We provide 24 hour/7 days a week global service and support for Dürr and competitor systems.
- We employ dedicated, hardworking individuals whose number one goal is to provide you with the best product and experience possible.

Following a detailed analysis of your process conditions and parameters and a review of all the available solutions, we conclude that the **Ecopure**® RL is the best system for your application. The RL is a state-of-the-art RTO design featuring a single rotary diverter valve, twelve heat recovery chambers enclosed in a single tower, and structured ceramic heat exchange media for maximum thermal efficiency and the lowest operating costs. The modular RL system is designed for maximum pre-assembly in the factory ensuring quality and minimal field installation time.

The Filter Box and RL-50 unit proposed is designed to treat 45,000 SCFM of exhaust from your Foundry Spraying process and offers the highest destruction efficiency of any RTO available on the market. The following are some of the key features of the RL system:

Standard RL Features	Customer Benefits
Skid mounted design (pre-piped, pre-wired)	Fast installation reduces cost
Single rotary valve	Reduced maintenance, increased reliability, high destruction efficiency
Integral air-conditioned control room	No need to find space for control panel, and pre-wiring reduces installation cost
Rotary valve is always in contact with hot exhaust gas	Reduces potential build-up of condensables on valve
Electric rotary valve drive	Increased reliability over hydraulic or pneumatic systems.
All drive components external to unit	Ease of access for maintenance
All fuel train components located at grade	Ease of access for maintenance
Compact design	Reduced foundation costs
Twelve heat recovery chamber design	Minimal pressure fluctuations Better air distribution Improved RTO performance
Continuous purge	Maximizes destruction efficiency
Bakeout	Reduces organic buildup and improves energy efficiency
Variable frequency drive (VFD)	Minimizes energy usage
Fresh air/purge damper	Independent start-up from RTO

Our proposal is for a RTO system to be delivered to your facility. Optional installation services and freight to site are included for your consideration, as well as clarifications on utilities and other services to be provided for the installation.

Ecopure® RL electric drive

1.2 References

Location: Kentucky
Industry: Chemical

Location: Florida
Industry: Metal & Plastic Packaging

Location: Kansas
Industry: Feed & Pet Food

Location: Virginia
Industry: Electronics

Location: Washington
Industry: Carbon Fiber

Location: Texas
Industry: Roofing Materials

1.3 Equipment pricing and schedule

1.3.1 Budgetary Equipment Pricing

Item 1 – Equipment One (1) **Ecopure**® RL-50 & Filter Box as described within. FCA Origin.	$920,000
Item 2 – Installation of Item 1 Installation of RL	$150,000
Item 3 – Freight - pre pay and add Budget cost for Item 1	$ 33,300
Item 4 – Installation Supervision Durr includes 150 hours of installation supervision. Additional labor required due to circumstances beyond Durr's control is per Durr standard rates attached.	$ 26,500
Item 5 – Start-up / Commissioning & Training Durr includes 150 hours of Start-up / commissioning and Training (training must coincide and immediately follow startup and commissioning activities). Additional labor required due to circumstances beyond Durr's control is per Durr standard rates attached.	$ 22,500

Pricing issued for informational purposes only. No purchase order will be accepted based on this proposal

All prices exclude any taxes, duties, broker fees, value-added taxes, income taxes, withholding taxes or any other allowances.

1.3.2 Typical Payment terms and payment schedule

25% due upon receipt and acceptance of purchase order
25% invoiced with drawing submittal, due net 30 days
45% due upon equipment ready for shipment, due net 30 days
5% due after successful performance testing
- Or - thirty days after equipment is made operational
- Or - if due to delays beyond Dürr's control, 90 days after final material shipment, whichever occurs first

Dürr will furnish detailed project schedule to meet the customer's needs after receipt and acceptance of purchase order.

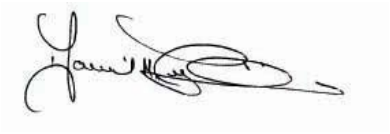
1.3.3 Typical delivery milestones

RTO delivery	20-24 weeks*
RTO installation	1-2 additional weeks
System start-up	1-2 additional weeks

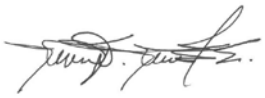
*RTO delivery to be confirmed at the time a purchase order is issued by buyer and accepted by Dürr

If for any reason this information is withheld from Dürr, the third milestone payment will be due net 0 days.

Dürr Systems, Inc.



By: _____
David Tyksinski
Key Account Manager

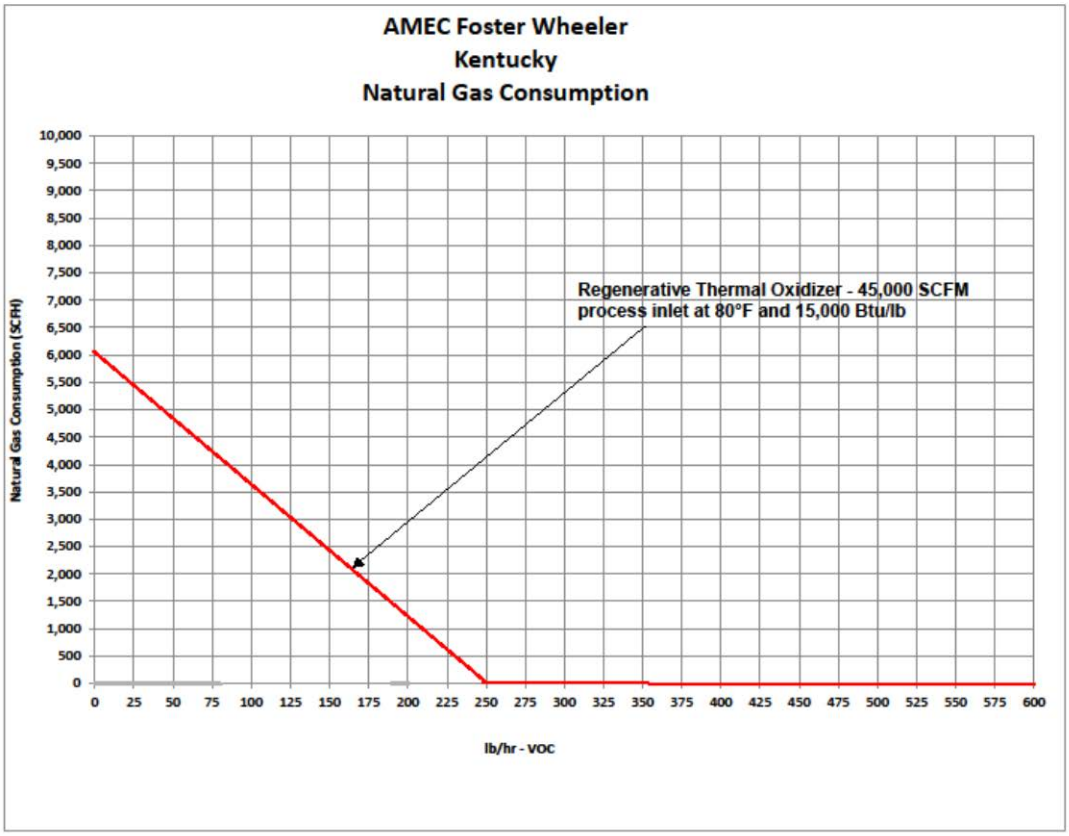


By: _____
Kevin D. Kennard Sr., P.E.
Applications Engineer

1.4 Estimated operating conditions

The following estimates of operating energy for the proposed RL unit are based on the process data provided:

Process exhaust: 45,000 SCFM @ 80 F
VOC Loading: 100 Lbs./Hr. (Assumed)



1.5 Performance guarantee

1.5.1 Volatile organic compounds (VOCs)

Subject to the General Provisions below, Dürr guarantees that when the inlet VOC concentration is above **250** ppm_v as propane, the RTO will destroy or convert at least **98**% of the incoming gaseous, non-methane volatile organic compounds (Inlet VOC as identified in Section 2.0 of this document). When the inlet VOC concentration is below **250** ppm_v as propane, the outlet non-methane VOC concentration will not exceed **5** ppm_v as propane.

1.6 General provisions

The following General Provisions will apply to all of the above guarantees:

a) The RTO will be installed (if applicable), operated and maintained by Buyer in accordance with Dürr instructions. This will include replacing of consumable or replaceable components by Buyer, as required.
b) Buyer agrees to operate the system within the system design data as specified in this proposal.
c) The performance guarantees apply only during normal operation, not during any maintenance procedures.
d) All functional tests will be arranged and paid for by Buyer. Dürr will be notified in writing 14 days prior to the tests for scheduling purposes.
e) Methane is excluded from outlet emissions.
f) Dürr reserves the right to adjust the burner chamber operating temperature as required to meet the guarantees.

If Dürr fails to meet the Performance Guarantee, Dürr will be given reasonable time to investigate and take corrective action within the scope of this contract.

1.7 Work to be provided by buyer

- Supply the following utilities to the connection points on the RL
- Fuel: Adequate supply of Natural Gas at 1,000 Btu/ft³ and regulated to 5.0 PSI steady.
- Power: 480 V, 3 PH, 60 Hz, with earth grounding.
- Air: 2 CFM of intermittent compressed air at 80 psig. Clean, dry air, suitable for outdoor use at local plant conditions is required.
- Failsafe inlet isolation damper
- Barometric damper or vacuum relief damper.

1.8 Clarifications

- Buyer certifies that there are no halogenated, acid generating, silicon bearing or phosphor compounds present in the inlet air stream coming to the proposed equipment. This includes, but is not limited to, fluorides, chlorides, bromides, iodides, astanides and sulfonated compounds. This warranty excludes deterioration arising from the presence of any of these compounds.
- Buyer certifies that the total alkali metal content does not exceed 5% of the total particulate discharged from the dryer. If alkali metals are in gaseous or liquid phase, acceptable concentration to be determined.
- If present, silicon-bearing compounds may cause plugging of the ceramic media and may require periodic cleaning and/or replacement of the media.
- If present, phosphor compounds may cause permanent plugging of the ceramic media and therefore require replacement.
- Fan, valve, RL skid ductwork and stack insulation are not included.
- Installation and connection of any remote HMI is by purchaser.
- Unless noted otherwise in this proposal, the equipment quoted is to Dürr Systems, Inc. standard design specifications. Any specification not mentioned but required by owner is subject to review and price adjustment.
- Note that condensate will form from combining hot oven air sources and cooler spraybooth emissions. If no filtration is to be included for the system, bake-outs or cleaning of the RL may be required. Frequency of these bake-outs is dependent on the efficiency of the spraybooth scrubbers and the amount of condensate formed from the hot and cold sources.
- Optional installation by a Dürr erection crew or subcontractor is based on the following items:
  There are no overhead obstructions.
  There is clear access, within 30 feet, to at least two sides of the site.
  The work will be performed by a non-union contractor.
  The work will be done on a straight time labor rate based on an eight hour day, five days a week (Monday through Friday), forty hours a week total. Any work required to be performed on Saturdays, Sundays, holidays or on an overtime basis will be to Purchaser's account. Any costs due to delays beyond Dürr's control will be to Purchaser's account.
  All safety procedures are to be per Dürr Systems standard procedures.

2 Technical data and responsibility matrix

2.1 Technical data

Customer specification	Design (per RTO)
Inlet temperature	80 °F
Inlet static pressure	(-) 2 in. w.c. @ inlet to RL unit
Moisture content	Std
Altitude	630 ft
Specified actual max. volume	45,000 scfm
VOC loading	Not provided, customer will provide for final design engineering. Dürr assumed a value of 100 lb/hr for this budgetary proposal.
VOC type	Methanol, Petroleum Distillates (hydrotreated light), Naphtha (petroleum - hydrotreated heavy), Solvent Naphtha (petroleum – light aromatic)
Total particulate loading maximum	Not provided, customer will provide for final design engineering
Estimated operating conditions	
Process airflow and temperature	45,000 scfm at 80 °F process air inlet temp.
Natural Gas	
With zero lbs/hr VOCs @ 15,000 Btu/lb	5.32 mmBtu/hr of net fuel heat input
With 100 lbs/hr VOCs @ 15,000 Btu/lb	3.09 mmBtu/hr of net fuel heat input
With 247.29 lbs/hr VOCs @ 15,000 Btu/lb	0.00 mmBtu/hr of net fuel heat input
Compressed air	2 scfm @ 80 psig at 100 lb/hr VOCs
Electric	135 kW usage at 100 lb/hr VOCs
Design parameters	design
Number of chambers	12 individual chambers
Heat exchanger media	Structured packing (monolith block)
Heat exchanger thermal efficiency	95.36 % mass corrected
Combustion chamber operating temperature	1,550°F
Bake-out	Type, manufacturer or comment
Off-line	Included
Utilities connections	
Natural Gas (burner max capacity)	7.4 scfh @ 5 psi connection point at RL skid
Compressed air	2 scfm @ 80 psi connection point at RL skid (connected peak)
Electric	480/3/60 to connection point on RL Skid

Dürr Systems, Inc. reserves the right to make modifications as deemed necessary during final engineering.

Specifications incorporated	
Customer specifications	None provided
ECOPURE® RL chamber	Type, manufacturer or comment
Materials of construction - upper chamber	3/16" thk., A36 plate., A992 structural
Materials of construction - lower chamber	1/4" thk., A36 plate., A992 structural
External coating	Finish paint, #34 Medium Gray
Internal coating	Not required
ECOPURE® RL chamber insulation	Type, manufacturer or comment
Interior combustion chamber	6" thk. 10 lb/ft³
Media support	Corten
Burners	Type, manufacturer or comment
Manufacturer	North American or Dürr approved equal
Number of burners	One (1) per RL unit
Flame monitor	UV scanner
Air injection	Included
Gas injection	Not included
Fuel enhancement	Not included
Gas trains	Type, manufacturer or comment
Blocking valve manufacture	Maxon or equiv
Combustion blower	New York Blower, with silencer, arrangement #4, 3600 rpm
NFPA 86 standard	pre-approved
Gas train enclosure	Not included
Burner/gas train access platform	Diamond plate
Platform access	OSHA standard-caged ladder
Individual components UL & FM listed	Included
Natural gas meter	Not included
Diverter valve and drive system	Type, manufacturer or comment
Diverter valve	Heavy duty carbon steel construction
Drive motor	3 hp, 480 volt, 3 ph, 60 hertz
Drive motor VFD manufacturer	SEW Movidrive
Gear drive guards	Personnel protection

Dürr Systems, Inc. reserves the right to make modifications as deemed necessary during final engineering.

Fan	Type, manufacturer or comment
Type	Centrifugal
Quantity	One (1)
Manufacturer	New York Blower or equal
Volume	45,000 scfm, 80° F inlet temperature
Arrangement	Included
Materials of construction	Mild steel
Inlet/Outlet flex connections	Included
Inlet/Outlet flex connections materials of construction	Fabric
Fan insulation and cladding	Not included
Motor size, RPM, manufacturer	200 hp., 1800 rpm, manufacturer
Motor service factor	1.00
Fan bearing and motor mounting plate	Included
Fan bearing forced lubrication system	Not included
Fan bearing temperature monitoring	Not included
Fan vibration switch	Included
Filter House	
Unit Component Sections	Pre-Filter, Intermediate Filter, Final Filter
Differential Pressure	Magnehelic Gauges for the above sections
Exterior, Interior, Floor Liner	Galvanized Steel
Dimensions	17’6” L x 11’8” W x 11’4” H
System controls	Type, manufacturer or comment
Master control panel	NEMA 12 for dust free and temperature controlled environment.
Programmable controller (PLC)	Allen-Bradley Compact Logix
Human machine interface (HMI)	Panel View Plus 700
PLC software	RS Logix
Programming, screen development, etc.	Included
Operating modes	Type, manufacturer or comment
Automatic sequence start	Included
Automatic sequence stop	Included
Fresh air stand-by mode	Start-up capability on fresh air
Hot shutdown mode	Included
Chart recorder	Endress+Hauser
Inlet temperature	Included
Outlet temperature	Included
Combustion chamber temperature	Included
Flame safeguard control	Honeywell
High temperature limit	Honeywell
Variable Frequency Drive	Type, manufacturer or comment
VFD manufacturer	Yaskawa
VFD size/quantity	200 hp.

Dürr Systems, Inc. reserves the right to make modifications as deemed necessary during final engineering.

Control room	Type, manufacturer or comment
Manufacturer	Dürr
Control room lighting	Included
Lighting transformer	Included
Heated & air conditioned	Included
Personnel access door with removable header	Included
Power distribution panel	Included
Exhaust stack	Type, manufacturer or comment
Height	30 ft
Materials of construction	A36
Personnel protection	Not included
Insulation & cladding	Not included
Test ports	Included
Stack drain	Included
Sampling platform	Not included. Access ports from RL roof
Safety ladder	Not included
Interconnecting manifolds	Type, manufacturer or comment
Inlet/outlet manifold diameter	Varies
Inlet/outlet manifold construction	12 ga. minimum carbon steel
Inlet/outlet manifold flex connectors	Fabric
Inlet/outlet manifold velocity	3,500 fpm
Personnel protection	Not included
Insulation and cladding	Not included
Dampers	Type, manufacturer or comment
Inlet isolation damper	Not included
Outlet isolation	Not included
Fresh air intake damper	Included
Inlet/outlet manifold vacuum breaker	Not included
Miscellaneous	Type, manufacturer or comment
Area lighting on the RTO only	Not Included
Source duct work	Type, manufacturer or comment
Process ductwork	Not included
Duct supports	Not included
Fire detection and suppression systems	Not included

Dürr Systems, Inc. reserves the right to make modifications as deemed necessary during final engineering.

Responsibility matrix

	Work Item	Owner	Dürr	Remarks
1.0	General conditions			
1.1	Building permits	X		
1.2	EPA permits	X		
1.3	Taxes	X		
2.0	General site work conditions			
2.1	Temporary utilities	X		
2.2	Daily job site clean-up	X		Optional installation
2.3	Building alterations, penetrations	X		If required
2.4	Temporary storage area on-site	X		If required
2.5	Demolition and disposal work			NA
3.0	Civil			
3.1	Footings and foundations	X		With grounding grid
3.2	Structural support steel			NA
4.0	Mechanical			
4.1	Piping fuel and gas	X		To connection point on RL
4.2	Compressed air piping	X		To connection point on RL
4.3	Fire protection	X		If required
5.0	Electrical			
5.1	Power feed	X		To Dürr control room on RL
5.2	Process interlock wiring	X		
6.0	Abatement equipment			
6.1	Engineering and fabrication of the abatement equipment as described in Technical Section		X	
6.2	Freight	X		Pre-pay and add
6.3	Installation		X	Optional
6.4	Installation supervision		X	150 hrs. on site
6.5	Start-up		X	150 hrs. on site
6.6	Operator training		X	In above
7.0	Plant acceptance			
7.1	Functional testing	X		
7.2	Compliance testing	X		
7.3	Spare parts		X	List only
7.4	Maintenance and operating manuals		X	One (1) CD copy, English only
7.5	Record mechanical and electrical drawings		X	One (1) CD copy, English only

3 RL system drawings (attached)

3.1 Process flow diagram

Please see the attached process low diagrams.

3.2 General arrangement

Please see the attached general arrangement diagrams.

3.3 Foundation loading

Please see the foundation loading diagrams.

4 RL brochure

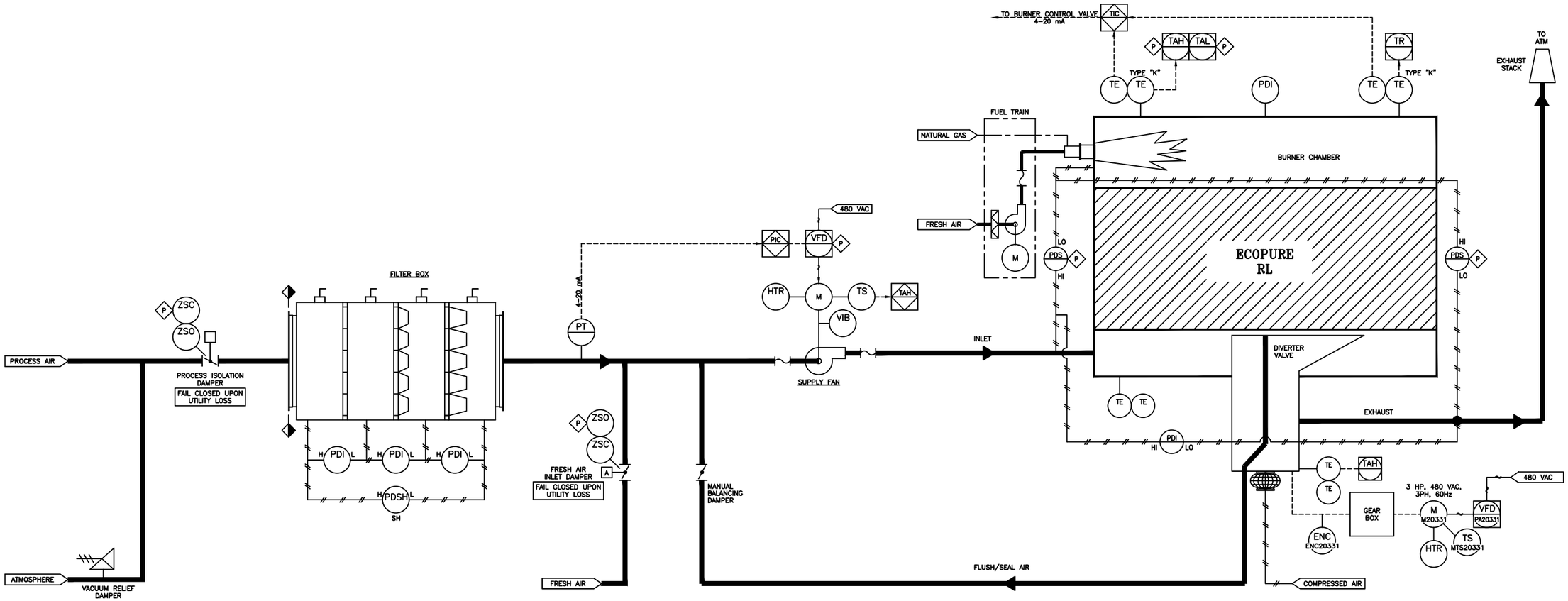
Please see the attached RL brochure.

5 Dürr terms and conditions (online document)

Please click **HERE** to view Dürr's Terms and Conditions, under the DSNA General Terms and Conditions of Sale link.

6 Service rates (attached)

Please see attached Service Rates.



P THIS INDICATES THAT THE DEVICE IS USED IN THE HARDWIRED PURGE CIRCUIT.

B THIS INDICATES THAT THE DEVICE IS USED IN THE HARDWIRED BURNER CIRCUIT.

SEE ELECTRICAL DRAWING FOR PURGE AND BURNER PERMISSIVES.

PRELIMINARY

AMEC FOSTER WHEELER
KENTUCKY

REV	DESCRIPTION OF CHANGE	DATE	BY

	DATE	BY
DRN	11.22.16	BRR
CKD		
APPD		KK
SCALE:	NOTED	

LEGEND

BY OTHER'S ◇ BY DÜRR

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DÜRR SYSTEMS, INC.
CLEAN TECHNOLOGY SYSTEMS
26801 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN

PROJECT – AMEC FOSTER WHEELER

TITLE
VOC EMISSION CONTROL ABATEMENT SYSTEM AIR FLOW SCHEMATIC

JOB NUMBER US04-83177

DURR DRAWING NUMBER F002 REV –

DURR STANDARD NUMBER –

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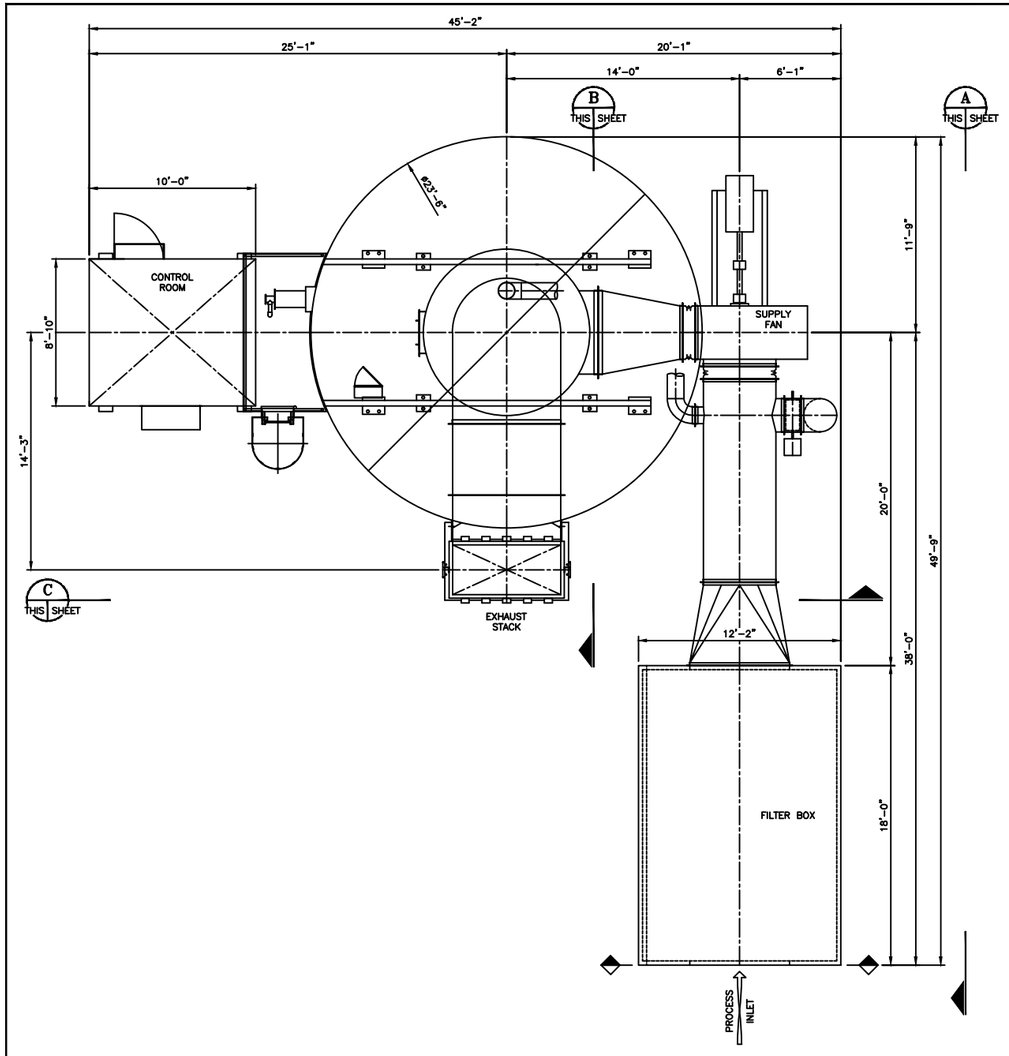

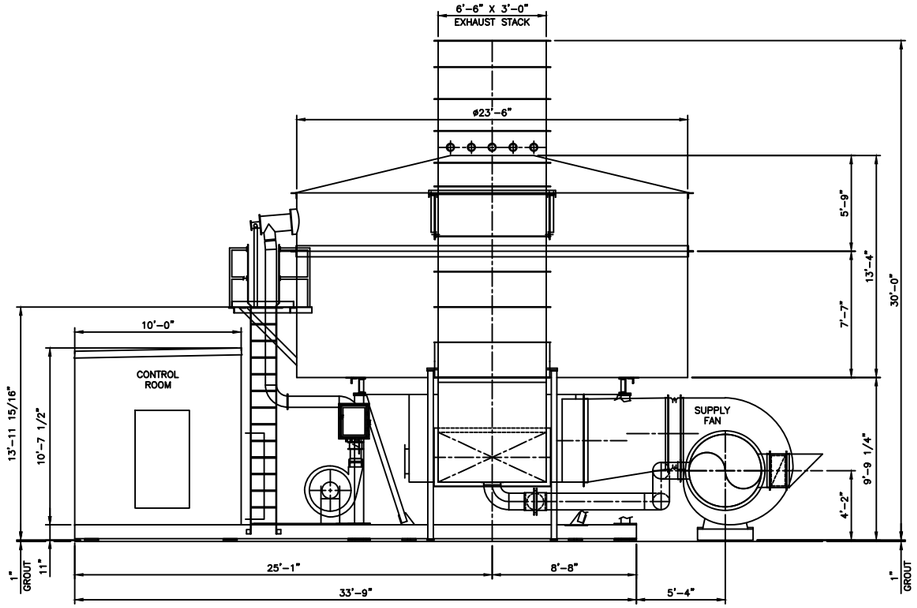

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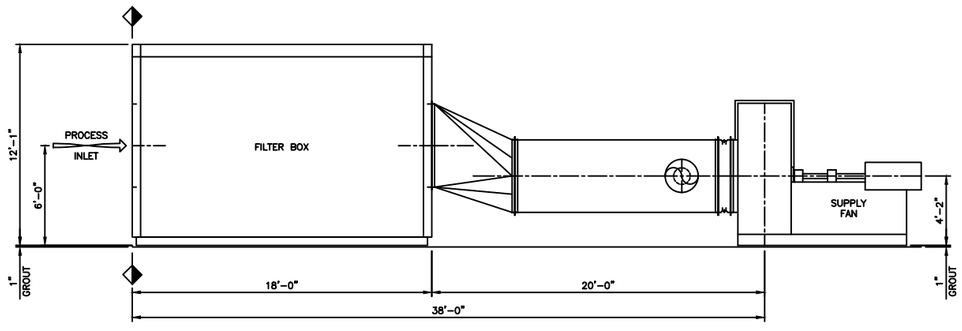

SECTION A
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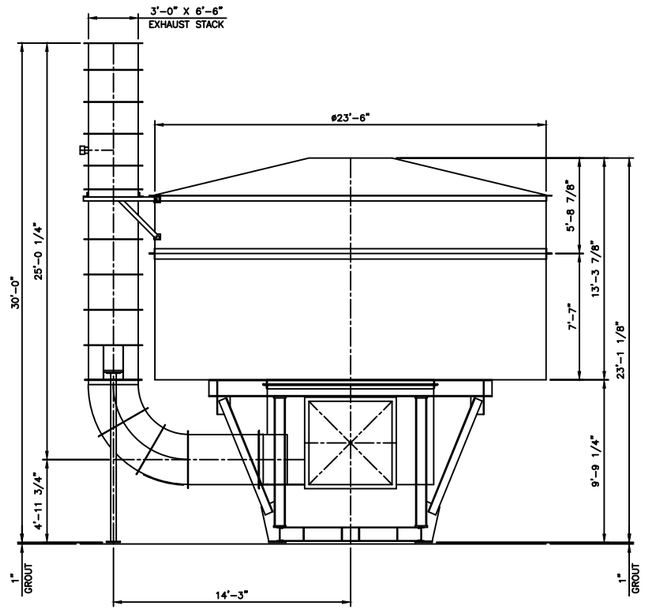

SECTION B
SCALE: 1/4"=1'-0" THIS SHEET

LEGEND

BY OTHER'S ◇ BY DÜRR

PRELIMINARY

AMEC FOSTER WHEELER
KENTUCKY

REV	DESCRIPTION OF CHANGE	DATE	BY

	DATE	BY
DRN	11.22.16	BRR
CKD		
APPD		KK

SCALE: NOTED

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DÜRR SYSTEMS, INC.
CLEAN TECHNOLOGY SYSTEMS
26801 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN

PROJECT – AMEC FOSTER WHEELER

TITLE
VOC EMISSION CONTROL ABATEMENT SYSTEM GENERAL ARRANGEMENT

JOB NUMBER	
US04-83177	
DURR DRAWING NUMBER	REV
M001	–
DURR STANDARD NUMBER	
–	

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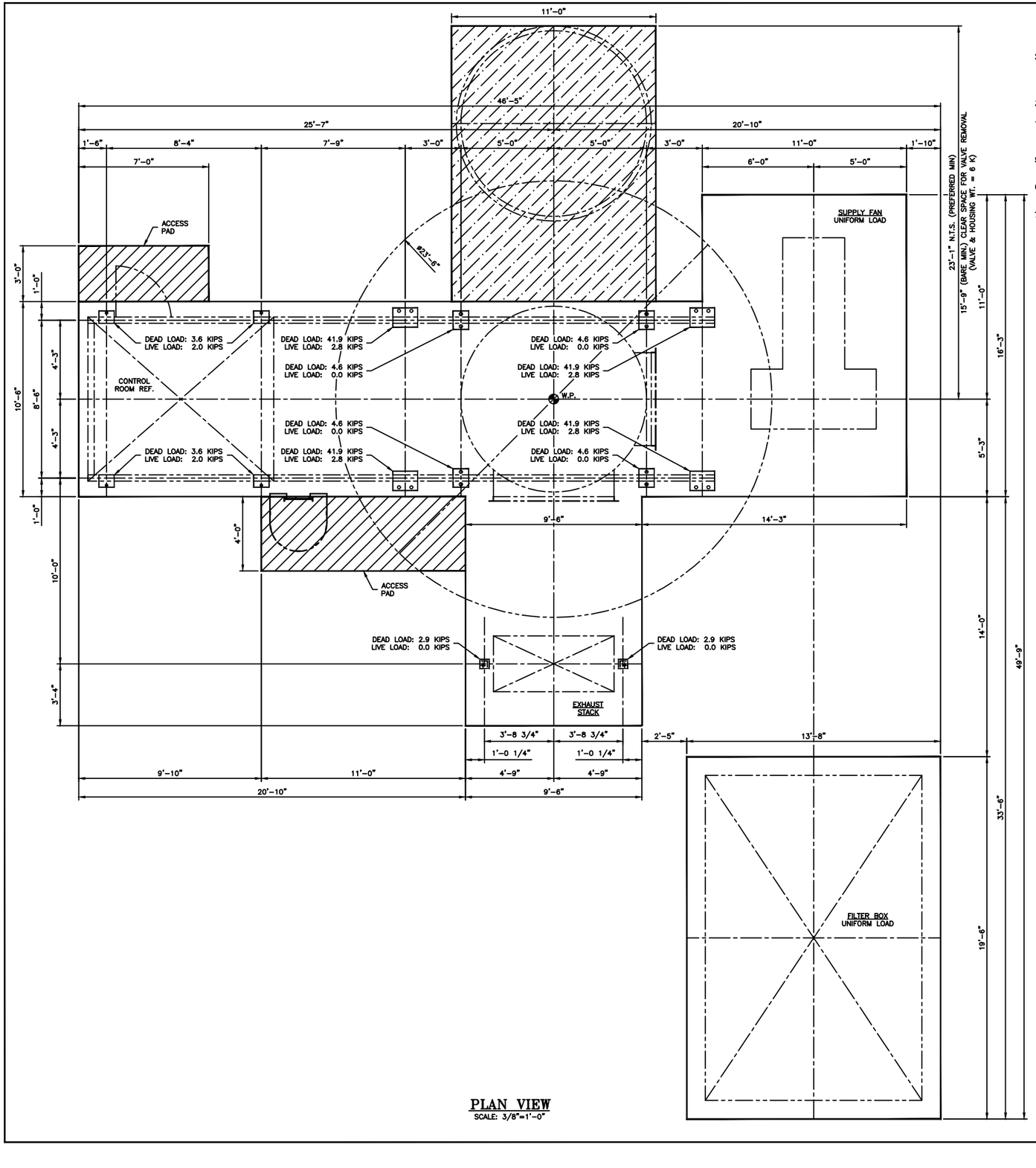
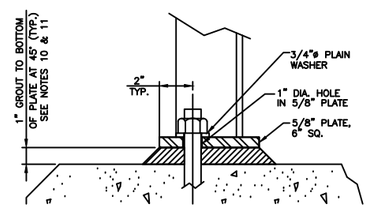


PLAN VIEW
SCALE: 3/8"=1'-0"

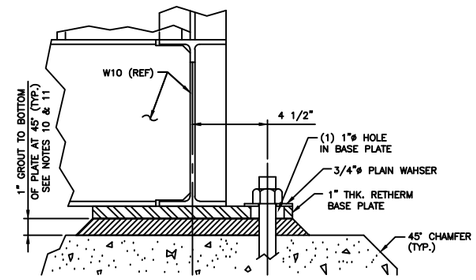
INSTALLATION NOTES

1. ALL FOUNDATION ENGINEERING SHALL BE BY OTHERS.
2. PAD DIMENSIONS SHOWN SHALL BE CONSIDERED AS MINIMUMS FOR EQUIPMENT ACCESS. DURR SYSTEMS, C.T.S. RECOMMENDS THAT ALL EXPOSED FOUNDATION EDGES BE BEVELED TO PREVENT CHIPPING. TOP OF ACCESS PADS SAME ELEVATION AS RTO PAD.
3. FOUNDATION CONCRETE ELEVATION TOLERANCE SHALL BE ±1/8".
4. FOUNDATIONS WILL BE CHECKED PRIOR TO EQUIPMENT PLACEMENT. ANY DISCREPANCIES IN FOUNDATION ELEVATIONS SHALL BE CORRECTED BY FOUNDATION INSTALLER BEFORE EQUIPMENT PLACEMENT WILL COMMENCE.
5. FOUNDATIONS SHALL BE FREE FROM DIRT, GREASE AND OTHER SUBSTANCES, PRIOR TO GROUT PLACEMENT.
6. ANCHOR BOLT DESIGN, INCLUDING MATERIAL SELECTION AND EMBEDMENT LENGTH, SHALL BE PERFORMED BY THE FOUNDATION DESIGN ENGINEER.
7. DURR SYSTEMS, C.T.S. RECOMMENDS THAT THE RTO INSTALLER USE "CHEMICAL SET" ANCHOR BOLTS, TO BE INSTALLED AT THE TIME OF SKID PLACEMENT; AND SEPARATE "CHEMICAL SET" ANCHOR BOLTS BE USED FOR THE RTO STACK AND FAN/MOTOR (IF APPLICABLE).
8. DRILLED– IN– PLACE ANCHOR BOLTS AND ASSOCIATED HARDWARE SHALL BE FURNISHED AND INSTALLED BY THE RTO INSTALLATION CONTRACTOR.
9. RTO INSTALLATION CONTRACTOR SHALL SHIM AND GROUT RTO SKID AND STACK BASE PLATES, AND FAN AND MOTOR SUPPORTS (IF APPLICABLE). DURR SYSTEMS, C.T.S. RECOMMENDS A 1" ALLOWANCE FOR SHIMS AND GROUT. MATERIAL RECOMMENDATIONS:
   - 9.1 SKID AND STACK SHIMS: _____ CARBON STEEL SHIM STOCK
   - 9.2 FAN AND MOTOR SHIMS (IF REQUIRED): _____ 304ss SHIM STOCK
   - 9.3 GROUT: _____ MASTERBUILDERS "MASTERFLOW" # 928 OR EQUAL (CONSULT DURR SYSTEMS, C.T.S. IF LESS THAN 1" OF GROUT IS REQUIRED)

   FOR PROPER INSTALLATION, FOLLOW GROUT MANUFACTURER'S INSTRUCTIONS.
10. GROUT SHALL BE TRIMMED TO BOTTOM OF BASEPLATES AT A 45 DEGREE ANGLE – NOT TO TOP OF BASEPLATES!
11. CONSULT DURR SYSTEMS, C.T.S. FOR SPECIAL GROUTING APPLICATIONS:
    - 11.1 AREAS OF KNOWN CHEMICAL ATTACK
    - 11.2 APPLICATION OF GROUT IN AMBIENT TEMPERATURES OTHER THAN RECOMMENDED BY GROUT MANUFACTURER
    - 11.3 EPOXY GROUT APPLICATION/USAGE.



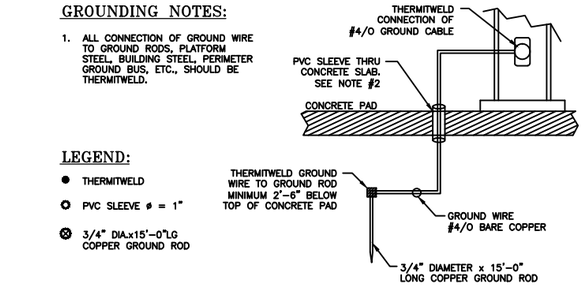
STACK SUPPORT
(2) PLACES
SCALE = 3"



RETHERM BASE PLATE
(10) PLACES
SCALE = 3"

GROUNDING NOTES:

1. ALL CONNECTION OF GROUND WIRE TO GROUND RODS, PLATFORM STEEL, BUILDING STEEL, PERIMETER GROUND BUS, ETC., SHOULD BE THERMITWELD.



LEGEND:
- ● THERMITWELD
- ○ PVC SLEEVE ø = 1"
- ⊗ 3/4" DIA.x15'-0"LG COPPER GROUND ROD

MOUNTING AND GROUNDING DETAIL OF EQUIPMENT SKID / STRUCTURAL STEEL, OR FAN BASE, OR EXHAUST STACK
NOT TO SCALE

NOTE:
THESE ARE GROUND RECOMMENDATIONS ONLY. ACTUAL GROUNDING DONE BY OTHERS.

PRELIMINARY

AMEC FOSTER WHEELER
KENTUCKY

REV	DESCRIPTION OF CHANGE	DATE	BY

	DATE	BY
DRN	11.22.16	BRR
CKD		
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SCALE:	NOTED	

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PROJECT – AMEC FOSTER WHEELER

TITLE
VOC EMISSION CONTROL
ABATEMENT SYSTEM
FOUNDATION LOADING

JOB NUMBER US04-83177
DURR DRAWING NUMBER C001 REV –
DURR STANDARD NUMBER –

ACAD PART NAME:

LEADING IN PRODUCTION EFFICIENCY

NEXT GENERATION RTO TECHNOLOGY
Ecopure RL - SINGLE VALVE THERMAL OXIDIZER

Advanced modular RTO system

What makes the **Ecopure** RL different?

The **Ecopure** RL is the most advanced regenerative thermal oxidizer (RTO) available. With a compact, rugged design, it offers the highest destruction efficiency and heat recovery of any RTO on the market.

This state-of-the-art design features a single rotary diverter valve and twelve heat recovery chambers enclosed in a single tower that arrives onsite in a pre-piped, pre-wired package that maximizes quality and minimizes field assembly.

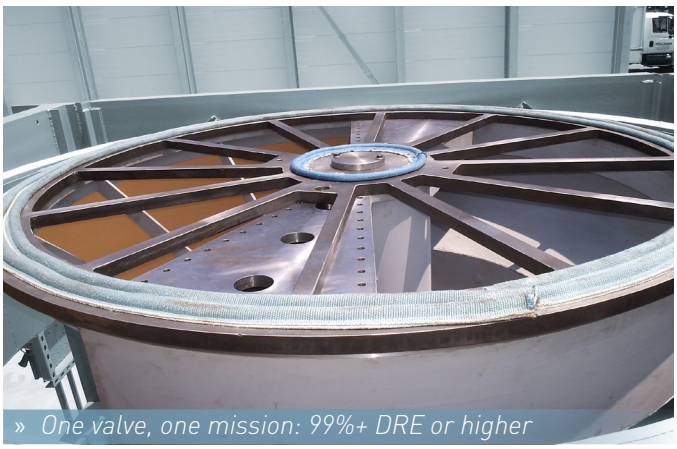
» *The **Ecopure** RL provides a modular, high performance, and cost efficient RTO system that fits in even the smallest footprints*

99%+ VOC removal is standard

The **Ecopure** RL provides the highest standard volatile organic compound (VOC) removal of any RTO available at 99%+. All RTOs use a combination of time, high temperature, and turbulence to destroy pollutants. Only the **Ecopure** RL does so with minimum moving parts.

The heart of the **Ecopure** RL is its simplicity. A single outlet diverter valve replaces all butterfly or poppet valves used in a conventional RTO.

This heavy-duty valve features machined, metal seats with a unique air seal that provides a 99%+ destruction of VOCs and HAPs. This ensures your plant will be compliant now and long into the future.



» *One valve, one mission: 99%+ DRE or higher*

*Scan to see a video of how the **Ecopure** RL operates*

COST EFFECTIVE ENGINEERING

Advantages that set the Ecopure RL apart

Performance, performance, performance. The **Ecopure** RL simply outperforms the competition.

- Standard 99%+ destruction efficiency - guaranteed
- Up to 95% thermal energy recovery
- Low pressure drop
- Particulate and condensable tolerant

Durable, low-maintenance design

If uptime is crucial and system downtime is unacceptable, the **Ecopure** RL is your only choice.

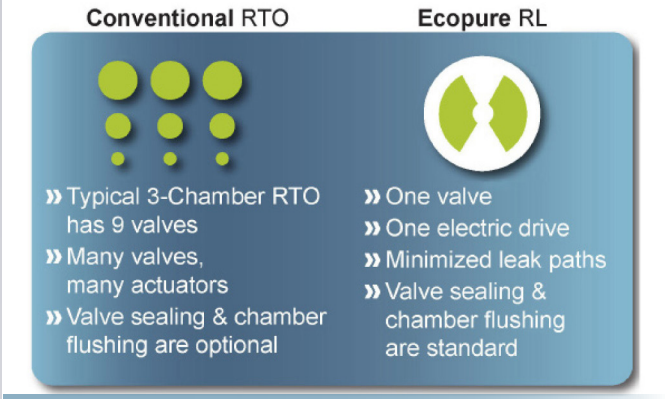
- Skid mounted design (pre-piped, pre-wired) makes for more cost effective install
- All drive components external to unit
- All fuel train components at grade
- Replaces multiple dampers used in conventional RTO
- Fewer moving parts, greater reliability
- Electric valve drive system replaces hydraulic and pneumatic drives found in typical RTOs
- Online bake-out option allows for removal of particulates, aerosols, and condesables without process interruption.

Diversity in industry

Dürr is your source for proven cost effective air emissions compliance solutions, with over 45 years of experience and 4,000 pollution control systems operating in a broad range of industries.

The **Ecopure** RL is available in pre-engineered sizes up to 100,000 SCFM+ per unit. The system is highly versatile and applicable in most industries and processes, including:

- Automotive & industrial painting
- Chemical & petrochemical
- Coating & printing
- Semiconductor
- Pharmaceutical
- Food processing & odor control
- Wood products
- Carbon fiber
- Biofuels and many more



» *Less valves, less maintenance, greater reliability*

» *Three 60,000 scfm **Ecopure** RL systems used for odor control at a pet food manufacturing facility in Kansas*

» *50,000 scfm **Ecopure** RL installed at a carbon fiber manufacturer in Washington.*

Subject to change. The information in this brochure contains only general descriptions or performance characteristics which may vary in actual cases. The requested performance parameters shall be binding only if they are explicitly agreed within the sales contract. © Dürr Systems, Inc.

General Terms and Conditions of Sale

Seller shall provide only the materials, equipment, and where applicable, the labor and services described in this Proposal in accordance with, and subject to, the following terms and conditions which are part of the Contract between Seller and Buyer and which are accepted by Buyer if Buyer either issues a purchase order covering the Work or otherwise authorizes the Seller to perform the Work.

No other material or equipment of any nature is included in the price stated in the Proposal. Buyer acknowledges it has inspected, examined, and studied all plans, specifications, prints, drawings, and material lists furnished by Seller and that it has approved the same, including, without limitation of the foregoing, Buyer's Scope of Work in connection therewith. For the purpose hereof, except as otherwise provided in this Proposal, Buyer's Scope of Work shall mean all site preparation, utility connections, etc., required for the installation of the equipment.

1. **Term of Proposal**. Unless otherwise provided, this Proposal is subject to acceptance by Buyer within thirty (30) days from the Proposal date.

2. **Delivery**. Unless otherwise provided, all shipments of materials and equipment shall be made by Seller Ex-works Origin. Title and risk of damage to or loss of goods shall pass to Buyer upon delivery of goods to carrier. No claim will be allowed unless made by Buyer within 7 days from receipt of shipment. This Contract is based on the current freight rates and the price is subject to adjustment in the event that a change in such rates affects Seller's cost of performance hereunder. Prices quoted are for furnishing and shipping complete, or in accordance with the delivery schedule specified, the quality or quantities listed for each item. Should shipping releases or schedules be changed for any reason beyond Seller's control, Seller reserves the right to invoice according to work performed by Seller through the date of any such change. If Buyer declines or is unable to take delivery at the time(s) specified in the Proposal or Contract, Seller will have the equipment stored for Buyer at Buyer's risk and account, and the materials shall be considered "delivered." Buyer shall pay storage, handling and re-handling charges and continue to make payments according to the payment terms contained herein.

3. **Installation**. If installation work is a part of this Contract, the equipment and/or machinery shall be assemble, erected and installed under the personal direction of an employee or agent of Seller. Buyer shall furnish sufficient electricity, water, compressed air, light, heat, sanitary facilities, and fire protection as well as adequate all-weather storage space, ingress and egress to the job site and other items that may be listed under Buyer's responsibilities. The site is to be prepared for installation personnel to work in a normal fashion with no extra equipment or procedures required due to construction or production interferences. Unless otherwise stated, installation shall be performed only during Seller's normal working hours and any overtime work required for any reason shall be requested by and paid for by Buyer.

4. **Site Access**. Unless otherwise provided, or waived in writing by Seller, the following will be available to Seller throughout the duration of the Work at no cost to Seller: A) A safety buffer zone shall be established nominally fifty (50) feet all around the base of Seller's work area, which will be maintained free and clear of all work, contractors, equipment and personnel; B) An adequate construction staging, lay down and material storage area for Seller's exclusive use shall be available adjacent to the safety buffer area. This area and the safety buffer shall be graded, leveled, well drained, and even with the top of the foundation and be suitable for delivery vehicles and Seller's equipment in all weather conditions; C) All weather access roads shall be made available and maintained by Buyer from a main highway and from the railroad sidings (if applicable) to Seller's area and the location of construction; and Seller's rail siding, (if applicable), shall be available to Seller within 300 feet, by the normal routing, of Seller's area.

5. **Licenses, Permits**. All building, erection or other licenses or permits necessary or related to the work, shall be secured and paid for by the Buyer.

6. **Changes and Differing Conditions**. A) If Buyer requests changes, or changes in site conditions or installation requirements occur subsequent to issuance of the Purchase Order, the parties shall renegotiate the price to reflect all expenses caused by the changes. B) Buyer, by written order accepted by Seller, may make reasonable changes in the scope of work subject to equitable adjustments in the Contract price and schedule, including an allowance for increased overhead and profit. Seller is not obligated to incur any expense or do any work in excess of that reasonably anticipated unless Buyer issues a written order for such expense and work with mutually acceptable terms and conditions. C) Seller reserves the right to make changes, subject to Buyer's approval, in design or material, which in Seller's judgment would improve the equipment and/or its operation. D) If Seller is installing equipment and any site conditions or installation requirements at the time of erection differ materially from those evident at the time of Seller's pre-bid site visit, Buyer's representations, and conditions ordinary to similar projects, then any additional costs caused by the differing site conditions or installation requirements shall be subject to equitable adjustment to the Contract price and schedule. E) If Seller's activities or operations at the site are interrupted by any party other than Seller, an equitable adjustment shall be made to the Contract price and schedule.

7. **Shipping, Delays, Suspension, Payment Acceleration**. All shipping dates are approximate, based on prompt receipt by Seller of all necessary information and are subject to change by reason of conditions beyond Seller's reasonable control as stated in Article 24. If a delay in shipment or installation is caused by Buyer or by any other cause beyond Seller's reasonable control, the portion of the Contract price already performed by Seller shall become due and payable within 30 days of shipment, or if not shipped, 30 days from the date the equipment is ready for shipment. If Buyer requires Seller to delay engineering, fabrication, shipment, installation, or start-up of the equipment and/or machinery under this Contract, Seller shall be entitled to full reimbursement for all costs incurred as a result of such delay. If Buyer suspends work on this Contract, Buyer shall reimburse Seller for all costs incurred by Seller as a result of such suspension. If the suspension exceeds 90 days, Seller shall also have the right to cancel the unfinished portion of the Contract without liability to Buyer of any kind and Seller will be paid according to Article 16.

8. **Other Contractors.** Seller has no duty or authority to direct, supervise or oversee any contractors of Buyer or to provide the means, methods or sequence of their work or to stop their work. Seller's services and/or presence at a site shall not relieve others of their responsibility to Buyer or to others. Seller shall not be liable for the failure of Buyer's contractors or others to fulfill their responsibilities, and Buyer agrees to indemnify, hold harmless and defend Seller against all claims arising out of such failures.

9. **Safety Devices**. Seller will supply such safety devices or fire protection equipment as is specified in the Proposal. If Buyer desires or requires through local, state, or insurance underwriter's specifications or regulations, other additional safety devices or equipment, Seller may elect to furnish same at Buyer's cost.

10. **OSHA – Federal, State & Local.** Seller will comply with the Federal OSHA requirements in effect as of the date of the Proposal relative to the Work. Seller's sole responsibility is limited to modification or replacement of the equipment cited as violating such standards. OSHA requirements with respect to noise are specifically excluded. Where state, local or Buyer's health and safety requirements differ from the Federal OSHA requirements, modifications or changes in design to meet such requirements will be incorporated at Buyer's request. Additional costs arising from such requests and from erection procedures required by state, local or Buyer's health and safety regulations which deviate from Federal OSHA requirements are for Buyer's account.

11. **Material/Workmanship Warranty (Applicable to Equipment, Systems, and Spare Parts Orders).** Seller warrants that all equipment it manufactures and furnishes and work provided will be free from defects in materials and workmanship for a period of twelve (12) months from the date Buyer is able to begin deriving commercial benefit from the work or eighteen (18) months from the date the first item is shipped, whichever occurs earlier. For equipment whose operation involves burners, commercial benefit is defined as the date of first burner ignition of the equipment. Seller's sole obligation is to repair or replace, at Seller's option, any part or component which, after Seller's inspection, proves to be defective, provided that Seller shall not be obligated for any removal, shipping or reinstallation costs. Seller will make repaired or replacement components available to Buyer in Seller's standard packaging, Ex-works Seller's shipping point. The warranty does not apply to consumable, replaceable parts or components normally subject to wear and replacement. Seller's obligations in this Article are subject to the following conditions: A) Receipt from Buyer of immediate written notice describing the defect in detail. B) Buyer shall not have attempted to correct the defect without Seller's approval. C) Buyer shall have installed (if applicable), operated and maintained the equipment strictly in accordance with Seller's operating and maintenance instructions, including, but not limited to, Seller's design basis or other design criteria stated in Seller's Proposal. D) The defect has been caused solely by faulty materials or workmanship for which Seller is responsible, and is not due to such things as erosion, corrosion, or deterioration resulting from the manner in which the equipment is operated, accident (including damage during shipment), neglect, misuse or abuse, or exposure to conditions beyond the environmental power or operating constraints specified by Seller.

To the extent that the materials and equipment furnished consist of products manufactured by other parties, such manufacturer's warranty is hereby assigned to Buyer, and Seller's responsibility with respect to any such products shall not extend beyond the manufacturer's warranty. It is understood that Seller's warranty with respect to such products is limited to repair or replacement at Seller's option and does not include labor, repair or replacement costs, or travel unless otherwise provided.

12. **Services Warranty (Applicable to Consulting, Design, Engineering, Inspection and Planning Orders).** A). Seller warrants that the services shall be performed in a competent and non-negligent manner. Within a period of twelve (12) months from completion of such services, Seller shall; at its cost, correctly re-perform any non-conforming services or, if such services cannot be re-performed, refund the amount paid for such non-conforming services. B). Seller warrants that any engineering and/or design work that it performs hereunder shall be performed in accordance with generally accepted trade or industry practice. Seller's liability for such warranty shall be fully satisfied by revision and resubmission of all calculations and drawings incorrectly completed as a consequence of breach of this warranty. C). Buyer expressly acknowledges and agrees that the foregoing warranties in this Article 12 are offered by Seller expressly contingent upon Buyer's strict compliance with Article 18, and further that any failure of Buyer to comply with the terms thereof shall be deemed as a breach of Buyer's obligations hereunder.

13. **Patent Warranty.** Seller shall defend, at its expense, any suit or proceeding brought against Buyer based on any claim that the equipment covered herein, except for equipment or material manufactured or designed to Buyer's specifications, infringes any U.S. patent issued as of the date of this Proposal, and pay any court imposed damages and costs finally awarded against Buyer, but not to exceed the amount previously paid to Seller by Buyer hereunder provided: A) Seller is promptly notified by Buyer in writing of such claim; and, B) Seller is given full authority, information, and assistance by Buyer which Seller deems necessary for the conduct of such defense. In order to avoid such claims and/or minimize potential liability, Seller shall have the right and option at any time to: A) procure for the Buyer the right to use the equipment; or B) modify the equipment so that it no longer infringes; or C) replace the equipment with non-infringing equipment.

14. **Performance Guarantee**. Seller's sole guarantees are those contained in its Proposal to Buyer. These guarantees are contingent upon the correctness and accuracy of the information provided by Buyer and are based upon the operating conditions specified in Seller's Proposal and operation and maintenance by properly trained personnel. These guarantees will be deemed satisfied by successful completion of performance tests in accordance with applicable standard procedures as specified in the proposal and in effect on the date of this proposal. Performance tests shall be conducted by the Buyer, (unless otherwise specified in Seller's Proposal), and witnessed by Seller, at its option, within 90 days of initial operation of the equipment. If the tests are not conducted within 90 days of the initial operation or within 6 months of shipment, whichever is earlier, and through no fault of Seller, the equipment shall be deemed accepted by the Buyer and in compliance with all contractual requirements. Seller makes no warranty whatsoever as to the inclusion of the equipment supplied by Seller into Buyer's manufacturing process, Seller's warranty being limited solely to the performance of its equipment in accordance with the applicable provisions in Seller's proposal. If the equipment fails to meet the Contract performance guarantees, Seller will supply at its sole option, repaired or replacement parts pursuant to the delivery terms of the Proposal subject to the limitations stated in Article 27.

15. **IMPLIED WARRANTIES/GUARANTEES DISCLAIMER. THE WARRANTIES AND GUARANTEES FURNISHED BY SELLER, AS EXPRESSLY INCLUDED HEREIN, CONSTITUTE THE SELLER'S SOLE OBLIGATION HEREUNDER AND ARE IN LIEU OF ANY OTHER WARRANTIES OR GUARANTEES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

16. **Cancellations**. If Buyer cancels for any reason at any time after Seller has received a purchase order (or other authorization) for any equipment, parts, or services or any combination thereof, Buyer shall pay to Seller within 30 days of such cancellation, all contract costs and other expenses incurred by Seller prior to receipt of the request for cancellation (including, but not limited to, engineering expenses, and overhead, costs of expended materials, direct labor with factory burden, and all commitments to Seller's suppliers, subcontractors and others), plus cancellation charges of 20% of the Contract price to cover general and administrative expenses plus 10% of the Contract price to cover profit lost by reason of cancellation. If Buyer materially breaches any obligation, then Seller may cancel the unfinished portion of the Contract without liability of any kind to Buyer. In any such case the terms of this Article 16 shall apply.

17. **Bonds.** If Seller agrees in writing to furnish any bond or bonds on account of the execution or fulfillment of this Contract, then the cost will be added to the quoted price. The penal sum of any bond or bonds furnished by the Seller in connection with this Contract shall be automatically reduced to 5% of the initial Contract value upon the date Buyer is able to begin deriving benefit from the work or 3 months after the date Seller notifies Buyer of its readiness to ship equipment, whichever occurs earlier. Buyer agrees to execute any acknowledgement or furnish documents required to effect this reduction.

18. **Credit and Payment**. A) Unless otherwise agreed, payment shall be as outlined in the Proposal and payments shall be made in current funds of the U.S. at par within 30 days of presentation of an invoice.

General Terms and Conditions of Sale

Payments not received by the due date shall be subject to a monthly interest charge at the rate of 2% per month or the maximum amount allowed by law, whichever is less, due and payable until the payment is received. B) Buyer shall also pay all collection costs of Seller on any delinquent amounts including, but not limited to, court costs and attorney fees. Seller will assess Buyer's financial condition and Seller shall have the absolute right to (i) limit the amount of credit that Seller may extend to Buyer for the purpose of goods hereunder, and delay manufacture or shipment of Buyer's orders based upon those limitations; (ii) require full or partial payment in advance; (iii) ship goods to Buyer C.O.D., require payment by irrevocable confirmed letter of credit, or require payment to be secured by letters of credit; (iv) require written guarantees of payment satisfactory to Seller; or (v) cancel or refuse to accept or fill any order from Buyer then outstanding or thereafter placed, all on terms satisfactory to Seller, in its sole and absolute discretion.

18.1 **Default in Payment**. A) If any payment due Seller is more than 30 days past due, Seller shall have the right at its sole option to accelerate the payment of all outstanding amounts, including, but not limited to, amounts previously retained pursuant to the Contract, by notifying Buyer in writing that all outstanding amounts are immediately due and presenting Buyer with an invoice. Seller shall also have the right in such event to discontinue all work on the project without incurring any liability to Buyer for such action; B) If the total aggregate amount of delinquent payments exceeds 10% of the total Contract price, Buyer shall provide, at Seller's request, additional collateral, including, but not limited to, irrevocable letters of credit, sufficient to secure payment of all Contract amounts; C) The foregoing remedies of Seller are in addition to all other remedies Seller may have at law or in equity, including, but not limited to, the right to obtain liens on Buyer's assets through legal or equitable proceedings.

18.2 **Security Agreements**. A) Buyer hereby grants to Seller a security interest in the equipment or materials sold hereunder to secure the purchase price of same. Buyer shall execute any financing or other statements or filings which in Seller's sole judgment are necessary or appropriate to evidence or perfect such security interest, which shall thereafter be filed by Buyer with the appropriate recording officer. This Contract shall constitute the security agreement between the parties and is intended to and shall afford the Seller all rights of a secured party under Article 9 of the Uniform Commercial Code; B) Until Buyer has paid the full amount due and owing for any equipment or materials purchased hereunder, Buyer shall be prohibited from transferring such equipment or materials to any creditor of Buyer other than Seller, unless Seller provides its prior written consent to such transfer, such consent not to be unreasonably withheld; C) If Buyer becomes insolvent, files for Bankruptcy, or goes into receivership or liquidation, Buyer agrees to use its best efforts and to provide all assistance requested by Seller in order to secure Seller's position as a preferred creditor with respect to all amounts due to Seller.

18.3 **Payment of Retained Amounts**. A) If this Contract permits Buyer to withhold final payment, and acceptance is not based upon performance tests, such payments shall be due and payable within 30 days after the equipment is ready for operation; B) If such deferred payment is contingent upon tests and such tests are delayed through no fault of Seller for more than 30 days after the equipment is first ready for operation, final payment shall be due and payable upon expiration of the 30 day period; C) If a retention value is required and agreed, it shall accrue interest at the rate of 1% per month on the outstanding balance until exchanged for a letter of credit or paid to Seller. Seller retains the right to provide Buyer with a letter of credit in lieu of retention at any time during the performance of the contract.

18.4 **International Project Payment Requirements**. If this Contract involves shipment of Seller's goods outside the U.S.A. the following payment terms apply, unless otherwise provided in Seller's Proposal: 1) Down Payment - EFT: The initial down payment will be made by EFT within 10 days after Seller issues an invoice and formal order acknowledgement letter to Buyer. 2) Other Payments- Commercial Letter of Credit: Balance of Contract price will be paid by Irrevocable Letter of Credit (L/C) issued within in USD by a Prime Bank within 30 days after Seller's issuance of its formal acknowledgement letter and covering the following payments:

a. Shipping Payment: L/C will allow a payment at sight against Seller's shipping documents (invoice, packing list and bill of lading/airway bill) presented to Seller's bank. Unless otherwise specified in Seller's proposal, the combined value of this payment and the initial down payment will equal 95% of the Contract price.
b. Final Retention Payment: (if applicable) will be due upon the earlier of, either 1) acceptance certificate, or 2) 180 days after date of bill of lading corresponding to last major shipment.

L/C General Requirements: A) The L/C will be issued on terms acceptable to Seller (generally described in this Article 18.4), and advised and confirmed by Seller's Bank. B) L/C will allow not less than 21 days after issuance of 3rd party transport documents for presentation of Seller's documents. C) L/C will expire in USA no earlier than 30 days after Seller's last shipment under the contract. D) L/C will allow partial and transshipments by ocean or air. E) L/C will be freely negotiable in USA with reimbursement instructions and authorizing reimbursement via SWIFT/TELEX. F) All banking charges for Buyer's account.

19. **Escalation**. Buyer will adjust the Contract price and pay Seller for: A) costs Seller has or may incur that were not anticipated by Seller as of the date of the initial Proposal or, B) the Contract exceeds the time frame contemplated by the parties.

20. **Taxes and Duties.** Unless otherwise provided, any tax or import duty imposed by any federal, state, local or municipal Authority arising out of the sale, manufacture or installation of the equipment or performance covered by this Contract, is not included in the price as quoted in the Proposal, and Buyer is responsible for any such amount(s).

21. **Proprietary & Confidential Materials**. All information supplied by Seller as to design, manufacture, erection, operation and maintenance of the equipment, including all drawings, patterns, specifications and information in Seller's Proposal or Contract, shall be the proprietary and confidential property of Seller and shall be returned to Seller at its request. Buyer shall have no rights in Seller's proprietary and confidential property and shall not disclose such to others or allow others to use such property, except as required for the Buyer to obtain service, maintenance, and installation for the equipment purchased from the Seller. Specifically, Buyer agrees that no drawings, specifications or information included in Seller's Proposal or Contract shall be used by Buyer for competitive bidding or similar purposes without Seller's consent and Buyer shall not reproduce or build assemblies or process systems per Seller's design drawings without explicit approval of Seller; B) Buyer shall hold in confidence and shall not disclose, divulge or publish to any person, or use or copy any trade secret, process, record, plan, projection, information pertaining to customers or prospective customers, financial information, marketing strategies, or any other confidential or proprietary information of Seller (including the terms and conditions of this Contract or any other agreement between Buyer or Seller) acquired or in connection herewith, or disclosed or transmitted by Seller or any of its agents, employees, or affiliates, except as authorized in writing by Seller, and Buyer shall keep, and shall require its officers, directors, employees, and agents to keep such information confidential; C) This clause shall survive the termination of this Contract and be in effect as long as Buyer has possession of any of Seller's proprietary or confidential information.

22. **Hazardous Materials**. If the Buyer's facilities contain hazardous materials, including asbestos bearing materials and any such materials are encountered, Seller shall have no obligation to remove or remediate them in the absence of a separate agreement which includes separate consideration to Seller for such work. If Seller or any of its subcontractors is required to perform work within or immediately adjacent to any facilities that are determined to contain hazardous material and/or asbestos, and the said work must be interrupted to allow for the remediation or removal of such materials by others, Seller shall be entitled to any and all costs and other expenses associated with such interruption in work. Buyer shall fully defend, hold harmless and indemnify Seller and its agents from and against any claim arising out of exposure to such hazardous and/or asbestos bearing materials.

23. **Health and Safety**. Seller shall not be responsible for health or safety programs or precautions related to Buyer's activities or operations, Buyer's other contractors, the work of any other person or entity, or Buyer's site conditions. Seller shall not be responsible for inspecting, observing, reporting or correcting health and safety conditions or deficiencies of Buyer or others at Buyer's site, and Buyer agrees to indemnify, hold harmless and defend Seller against any claims arising out of such conditions or deficiencies. So as not to discourage Seller from voluntarily addressing health or safety issues while at Buyer's site, in the event Seller does not address such issues by making observations, reports, suggestions or otherwise, it is understood and agreed that Seller shall nevertheless have no liability or responsibility arising on account thereof.

24. **Delays and Damages – Force Majeure**. A) In the event of delays in the performance of the obligations hereunder or damages due to conditions beyond Seller's reasonable control, including, but not limited to acts of God, acts of Buyer, or Buyer's customer or other contractors employed by Buyer, acts of civil or military authority, governmental restrictions, prohibitions and regulations, priorities, fire, storms, strikes, floods, epidemics, quarantine restrictions, war, riot, delays in transportation, car shortages, or Buyer's inability to obtain necessary labor, materials, or manufacturing facilities, the Contract dates shall be extended by an equitable period of time and Seller shall be entitled to an equitable adjustment in the Contract price. B) Acceptance of the equipment by Buyer shall constitute a waiver of all claims for damages. C) Seller's shipping dates are approximate. Seller's performance is predicated on certain performance of Buyer and Seller is not responsible for loss or damage arising from delays caused by Buyer's inability to act, failure to perform, or failure to provide complete and/or accurate information. D) This Section shall in no event be construed to relieve Buyer from the obligation to pay for goods shipped by Seller.

25. **Disclaimer of Consequential Damages.** Seller, it's subsidiaries, affiliates, agents, or employees shall not be liable to Buyer for incidental, indirect, special, liquidated or consequential damages, including, but not limited to, loss of profits or revenue, loss of use of equipment, costs of replacement or substitute goods or product, costs of capital, additional expenses incurred in the use of equipment or facilities, or claims of third parties. This disclaimer shall apply to consequential damages based upon any cause of action whatsoever asserted against Seller, including one arising out of any breach of warranty, express or implied; guarantee; products liability; negligence; tort; or any other theory of liability.

26. **Indemnification by Buyer**. Buyer shall indemnify Seller for, and hold Seller harmless from, all costs and expenses incurred by Seller, including, without limitation, costs of investigation, attorney's fees, and amounts paid in settlement or satisfaction of claims, proceedings or judgments in connection with all claims and proceedings against Seller based upon claimed defects in design in any equipment or material manufactured for Buyer by Seller to Buyer's specifications or design.

27. **Limitation of Liability.** Seller's liability for any and all claims, including property damage and personal injury claims, allegedly resulting from breach of contract, tort, or any other theory of liability shall not exceed either A) the amount of the initial purchase price paid to Seller by Buyer in contracts up to one million USD in value, or B) 25% of the total contract price in contracts greater than one million but less than fifty million USD in value. Seller's liability for property damage and personal injury is limited to the amount indicated on Seller's insurance certificate issued by Seller for this contract.

28. **Buyer's Negligence and Insurance**. Seller shall not be responsible for losses or damages arising out of the negligence of the Buyer, its employees, agents or architects or those of third parties for whom Seller is not responsible, or losses for which the Buyer has agreed to provide insurance. If both Seller and Buyer are negligent and the negligence of both is the proximate cause of the accident, then each party will be responsible for its portion of the liability or damages (excluding consequential or indirect damages which are disclaimed by Seller) resulting therefrom equal to such party's comparative share of the total negligence.

29. **Severability.** Should any part of this Contract be declared invalid or unenforceable, such decision shall not affect the validity of any remaining portion, which remaining portion shall remain in full force and effect, and Seller shall have the right to replace the part declared invalid or unenforceable with a provision which serves as much as validly possible the same commercial purpose as the part determined to be invalid or unenforceable.

30. **Assignment/Subcontracts**. This Contract shall be binding upon and inure to the benefit of the parties, their successors, and assigns provided that Buyer may not assign the Contract without prior written consent of Seller. Seller may subcontract any portion of the work.

31. **Disputes.** If a dispute arises hereunder, the parties will confer and attempt to amicably resolve the dispute. If after good faith negotiation, the parties cannot reach agreement, then the matter will be finally resolved in any court having jurisdiction and venue located within the County of Oakland, State of Michigan or the U.S. District Court for the Eastern District of Michigan.

32. **Entire Agreement, Contract Interpretation, Governing Law**. All communications, written and verbal, between the parties with reference to the subject of this Contract prior to the date of acceptance are merged herein, and this Proposal, when duly accepted and approved, shall constitute the sole and entire agreement and Contract between the parties. No change in or modifications of said Contract shall be binding upon the parties or either of them, unless the changes or modifications shall be duly accepted in writing by both parties. Unless Seller expressly agrees to the contrary in writing, these General Terms and Conditions of Sale (including statements made in the Proposal) shall govern any conflict with any in Buyer's documents. Any contract resulting from this Proposal shall be construed, governed and enforced in accordance with the laws of the State of Michigan, exclusive of the choice of law rules thereof. The U.N. Convention on Contracts for the International Sale of Goods shall not apply to this Contract.

1.0 DÜRR SYSTEMS, INC. FIELD SERVICE RATES

1.1 Term of Proposal: Unless otherwise provided, this Proposal is subject to acceptance by Buyer within thirty (30) days from the Proposal date.

1.2 Domestic:

a. From the hour the Seller's representative leaves the basing point and including the hour of Seller's representative's return to its basing point, payment shall be made by Buyer to Seller at the rates listed below.

b. A workday is defined as any day, Monday through Friday, whether actual work is performed or not. Also, any travel time to or from the base point is considered a workday and payment shall made in accordance with the applicable workday rates defined herein.

		US, Canada Mexico Rates	International Rates
Field Labor	Straight Time	$110/hr.	$137.50/hr.
	Overtime	$135/hr.	$168.75/hr.
	Sun/Holiday	$165/hr.	$206.25/hr.
	Travel Time	$110/hr.	$112.50/hr.
Field Service	Straight Time	$120/hr.	$150.00/hr.
	Overtime	$150/hr.	$187.50/hr.
	Sun/Holiday	$180/hr.	$225.00/hr.
	Travel Time	$120/hr.	$125.00/hr.
Engineer	Straight Time	$145/hr.	$168.75/hr.
	Overtime	$175/hr.	$218.75/hr.
	Sun/Holiday	$210/hr.	$262.50/hr.
	Travel Time	$145/hr.	$168.75/hr.
Sr. Engineer / Project Manager	Straight Time	$160/hr.	$187.50/hr.
	Overtime	$195/hr.	$243.75/hr.
	Sun/Holiday	$225/hr.	$281.25/hr.
	Travel Time	$160/hr.	$187.50/hr.
Modem Support		$150/hr.**	$150/hr.**

** Billed in ¼ hour segments, with 1 hour minimum, unused portion credited against future support.

The minimum workday charge will be based on a full eight (8) hour day.

Mileage charges for the usage of ***personal vehicles will be billed at $.67 per mile*** from the representative's basing point.

2.0 EXPENSES

2.1 Transportation

Travel by air will be Coach Class for US, Canada and Mexico, Business Class for International. Round trip transportation to and from the job site location will be billed at cost plus a ten percent (10%) processing fee.

2.2 Room, Board and Local Transportation

Meals, living expenses, such as lodging, laundry, etc., and local car/equipment rental will be billed at cost plus a ten (10) % percent processing fee.

2.3 Subcontractor Charges

Charges from Seller's subcontractors will be billed at cost plus a fifteen percent (15%) processing and administration fee.

COMPANY CONFIDENTIAL - TRADE SECRET AND PROPRIETARY INFORMATION OF DÜRR SYSTEMS, INC.

3.0 MISCELLANEOUS

3.1 Rate Adjustments

Unless otherwise agreed, rates will be paid as set forth in this Proposal and may be adjusted to those in effect at the time the service is performed. **The listed rates are available only for calculating additional labor cost. These rates are not to be used for calculating deducts of labor cost without the expressed written consent of Dürr Systems, Inc.**

3.2 Lay-Over Expense

Where circumstances require that a service representative be held over on weekends during which no work is performed, charges will be made for eight (8) hours per day at the straight time rate and living expenses will be billed per Section 2.

3.3 Cancellation

In the event the Buyer should cancel a service requirement less than five (5) business days in advance of a previously agreed upon start date, a cancellation fee of one (1) day's service will be charged per Section 1 above.

3.4 Reporting/Engineering Services Charges

Standard reports may be issued for all field service visits, whether completed on-site or after departure from site. Appropriate report writing time will be invoiced accordingly.

Unless otherwise provided, all engineering services or other work performed by the Seller at its basing point or its offices, including report research and/or writing will be billed at $135 or $150 per hour per Section 1.1 above.

COMPANY CONFIDENTIAL - TRADE SECRET AND PROPRIETARY INFORMATION OF DÜRR SYSTEMS, INC.

Appendix P
Coating Permits – Similar Operations

ADEQ
MINOR SOURCE
AIR PERMIT

Permit No. : 209-AR-9

IS ISSUED TO:

NIBCO, Inc - Blytheville Division
4059 Highway 18 East
Blytheville, AR 72315
Mississippi County
AFIN: 47-00009

THIS PERMIT IS THE ABOVE REFERENCED PERMITTEE'S AUTHORITY TO CONSTRUCT, MODIFY, OPERATE, AND/OR MAINTAIN THE EQUIPMENT AND/OR FACILITY IN THE MANNER AS SET FORTH IN THE DEPARTMENT'S MINOR SOURCE AIR PERMIT AND THE APPLICATION. THIS PERMIT IS ISSUED PURSUANT TO THE PROVISIONS OF THE ARKANSAS WATER AND AIR POLLUTION CONTROL ACT (ARK. CODE ANN. SEC. 8-4-101 *ET SEQ.*) AND THE REGULATIONS PROMULGATED THEREUNDER, AND IS SUBJECT TO ALL LIMITS AND CONDITIONS CONTAINED HEREIN.

Signed:

Mike Bates
Chief, Air Division

Date

NIBCO, Inc - Blytheville Division
Permit #: 209-AR-9
AFIN: 47-00009

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List of Acronyms and Abbreviations

A.C.A.	Arkansas Code Annotated
AFIN	ADEQ Facility Identification Number
CFR	Code of Federal Regulations
CO	Carbon Monoxide
HAP	Hazardous Air Pollutant
lb/hr	Pound Per Hour
No.	Number
NO_x	Nitrogen Oxide
PM	Particulate Matter
PM_{10}	Particulate Matter Smaller Than Ten Microns
SO2	Sulfur Dioxide
Tpy	Tons Per Year
UTM	Universal Transverse Mercator
VOC	Volatile Organic Compound

Section I: FACILITY INFORMATION

PERMITTEE:	NIBCO, Inc - Blytheville Division
AFIN:	47-00009
PERMIT NUMBER:	209-AR-9
FACILITY ADDRESS:	4059 Highway 18 East Blytheville, AR 72315
MAILING ADDRESS:	4059 Highway 18 East Blytheville, AR 72315
COUNTY:	Mississippi
CONTACT POSITION:	Mr. Freddy Gentry
TELEPHONE NUMBER:	(870) 763-7044
REVIEWING ENGINEER:	Shawn Hutchings
UTM North South (Y):	Zone 16: 3978.80
UTM East West (X):	Zone 16: 242.10

Section II: INTRODUCTION

NIBCO, Inc., Blytheville facility manufactures cast iron valves using grey and ductile iron produced from scrap iron and steel. Operations are housed in several buildings. The two main buildings are designated as Building 27 and Building 28. The operations at this facility include foundry, machining and assembly operations, painting and surface coating, storage, and shipping.

Summary of Permit Activity

This permit adds a new burn-off oven to replace NIBCO's old burn off oven, SN-21. The new oven is rated at 3.0 BTU/hr and will be given the same source number.

Process Description

Foundry operations start with the production of cores and molds. The cores and molds are an integral part of the valve manufacturing business in that they provide the basic framework upon which the valve is manufactured. Cores are the portions of foundry molds that shape the interior of a hollow casting. The cores are made from new silica sand using resins and binder materials, among which are phenolic resins, polymeric isocyanate, catalysts, and other resins to solidify sand into cores.

There are several types of binder catalyst combinations. NIBCO operates five core machines which use iso-cure (phenolic urethane cold box) system. Four of the core machines are exhausted through a scrubber, SN-29. This permit covers the conversion of the fifth core machine, Sinto Core Machine, from an ester-cured phenolic cold box to a phenolic urethane cold box resin based system. In addition to the chemical change, a scrubber will be added to control emissions.

A mold is a frame inside which the valve is cast, or a cavity in which the valve takes its form. Most molds are made using the green sand process. Green sand is made from combining silica sand with a premix containing natural clay, sea coal, and water. Some molds are made using a no-bake process. The cores are placed inside the molds, sometimes with the aid of chaplets that help to prevent deformation of the casting depending on the size of the valve. Some of the castings which are manufactured do not facilitate the use of cores.

The next part of the process can be referred to as the melting process. This involves taking scrap steel, pig iron, and several alloying materials, such as ferric sulfate and ferrosilicon magnesium, and melting them in one of the four electric coreless induction furnaces. The scrap steel must be preheated to eliminate any moisture prior to being placed into the furnace. The molten metal (grey iron) is poured into the preheated ladles, transferred via a monorail system controlled by foundry personnel, and then poured into the molds. To smooth operations, molten metal can be held in the 20 ton capacity BBC holding furnace. Approximately two thirds of gray iron is converted into ductile iron (inoculated) to meet customers' specifications on ready products.

Inoculation, also called magnesium treatment, is conducted by introducing certain allowing elements (primarily magnesium) into the molten iron. Other (non-ductile) inoculants may be introduced into the furnace or ladles for metal chemistry purposes.

Casting pouring, cooling, and shakeout operations are conducted at one of three pouring lines. Once the poured molds are cooled, shakeout operations remove the core and mold sands from the cast valve. The used sand from both the molds and the cores is screened and recycled through a conveyor system where new additives are added to produce green sand for new moldings. Gates and runners are the solidified paths created during the pouring process. They are removed from the ready castings and returned to the scrap area for remelting. Returned metal, including bad castings, comprises 50-55% by weight of the metal poured.

The final process, which occurs before the castings go to the machining and ancillary operations, is shot blasting and grinding. Shot blasting uses steel shot as an abrasive to remove adhering sand and cosmetically clean the surface of the cast valve. Grinding removes excess flanges, gates, and runners which remain.

Machining operations bring the valves to company specifications in order to meet company quality control requirements. The machining operations are performed by automated machining lines and manual machines such as lathes, drill presses, mills, and custom built machining centers. Other operations include heat treating the ductile iron products. Heating the products is done to increase the machinability of the castings.

The process flow within building 28 is a set of smaller operations that includes the main shipping and receiving department, the rubber molding operation, and ancillary processes. In the rubber molding operations, butterfly castings are placed in a shot blaster where they are cleaned. The particulate emissions from the shot blasting operations are controlled by a fabric filter. A bonding agent is then applied to the inner rim of the casting. This bonding agent enables the rubber to adhere to the iron. The castings are then transferred to the rubber mold area. The castings are preheated and placed into the rubber molding machine. If the rubber mold coating does not meet quality requirements, the valve is sent to the burn-off oven. Castings leaving the burn-off area then reenter the molding operation.

Ancillary processes are comprised of machining, painting, assembly, testing and shipping of the finished products. NIBCO also paints some valves. The surface coating operations are conducted in two paint booths located in Building 28. Additional coating operations, powder coating and dip painting are located in a separate building.

Regulations

The following table contains the regulations applicable to this permit.

Regulations
Arkansas Air Pollution Control Code, Regulation 18, effective February 15, 1999

Regulations of the Arkansas Plan of Implementation for Air Pollution Control, Regulation 19, effective December 19, 2004

The following table is a summary of emissions from the facility. This table, in itself, is not an enforceable condition of the permit.

Total Allowable Emissions

TOTAL ALLOWABLE EMISSIONS		
Pollutant	Emission Rates	
	lb/hr	tpy
PM	37.6	81.7
PM10	37	80.9
SO2	0.6	0.6
VOC	129.3	80
CO	63.3	70.1
NOx	1.7	6.6
Lead	0.071	0.08
Benzene*	2.7	2.8
Formaldehyde*	0.1	0.1
Naphthalene*	0.14	0.15
Toluene*	1.3	1.4
1-methylnaphthalene*	0.05	0.05
Acetaldehyde*	0.12	0.12
Ethylbenzene*	3.04	0.75
Cumeme*	0.04	0.04
Propanol*	0.03	0.03
Xylene*	13.6	3.6
Cresol*	0.08	0.08
Phenol*	0.28	0.28
Styrene*	0.07	0.07
Polycyclic Organic Matter*	0.15	0.07
Manganese*	0.05	0.05
Hexane*	8.8	2.2
Methanol*	13.6	1.5
Triethyl Amine*	0.4	0.1
Other HAPs (non specific) *	51	10

Section III: PERMIT HISTORY

Permit 209-A was issued to NIBCO of Blytheville on January 25, 1974. This was the initial permit for the facility.

Permit 209-A(Modification) was issued to NIBCO on January 29, 1975. This modification allowed for the addition of a rotoclone to replace two filters and the addition of two small filters on the sand silos.

Permit 209-AR-1 was issued to NIBCO, Inc. on May 10, 1986. This modification allowed for the installation of a sand cooling system controlled by a cyclone. This is the first permit issued to the facility after Secondary Metal Production facilities were added to the source category list. The facility is still not a PSD major source because its foundry emissions are below the 100 TPY threshold.

Permit 209-AR-2 was issued to NIBCO, Inc. on March 4, 1993. This permit added several sources. These new sources were numbered SN-10 through SN-22. With the addition of these sources the potential emissions from foundry operations at NIBCO are now over 100 tpy and NIBCO is now a PSD major facility.

Permit 209-AR-3 was issued to NIBCO, Inc. on November 18, 1993. This permit modified SN-22 to include three burners. This additional source was not associated with the foundry operations at the facility.

Permit 209-AR-4 was issued to NIBCO, Inc. on September 30, 1994. This permit revised the emissions for VOC at the facility. Although PM_{10} emissions at the facility increased more than the 15 tpy significance level, there were no physical modifications to the facility. The emission increase was from changes in emission factors and hour of operation changes. These changes would not be defined as a modification under PSD regulations.

Permit 209-AR-5 was issued to NIBCO, Inc. on October 4, 1995. This permit added sources SN-23 through SN-28. These sources were not associated with foundry operations at the facility.

Permit 209-AR-6 was issued to NIBCO, Inc. on July 15, 1996. This permit added a core machine, (SN-29), and a shot blast machine, (SN-30). The total potential to emit for these two sources is 1.6 tpy of PM_{10}.

Permit 209-AR-7 was issued to NIBCO, Inc on June 14, 2002. This permit was to be the initial Title V permit for the facility. However, NIBCO submitted a revised application which had emissions which were lower than the Title V thresholds. The facility made several changes which are covered by this permit. The first change was removing the wet dust collectors and installing a baghouse, SN-01, to control particulate emissions from the foundry operations. The facility also installed a powder coating operation, SN-14, and changed chemicals in their Sinto Core Machine and added a scrubber, SN-32, to control its emissions.

NIBCO, Inc - Blytheville Division
Permit #: 209-AR-9
AFIN: 47-00009

Permit 209-AR-8 was issued on April 8, 2004. This permit makes changes to resolve the appeal issues. In this permit HAP flexibility was added for sources SN-13, 14, and 16. Testing requirements for SN-07, 08, and 10 were removed. The facility recalculated the emissions by removing a building collection efficiency and provided better documentation for the basis for the emission factors. Therefore, testing these sources was not necessary to show compliance. The pound per gallon VOC limit for SN-13 was corrected from 4.81 to 4.92. The emission limits for SN-25 were corrected. More specific language was added as to which requirements applied to SN-29, SN-29a and SN-30. And, the roadways and parking areas were added as insignificant activities.

The NIBCO facility is a valve manufacturing facility. However, the facility includes an iron foundry which is a PSD source category. The facility in previous permits was a major source for PSD since the iron foundry is a category source and emissions from the foundry operations of the facility were greater than 100 tpy for PM_{10}. Previous permits and permit applications stated incorrectly that the facility was not a category source. Therefore, all emissions associated with the foundry are subject to the 100 tpy PSD threshold. The remainder of the facility's emissions including foundry emissions is subject to the 250 tpy PSD threshold for non-category sources. This permit will include federal limits for NIBCO's emissions and thus making them no longer a major source under PSD or Title V.

Section IV: EMISSION UNIT INFORMATION

Specific Conditions

1. The permittee shall not exceed the emission rates set forth in the following table. [Regulation 19, §19.501 et seq., effective December 19, 2004 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

SN	Description	Pollutant	lb/hr	tpy
01	Charge Preheat, Metal Inoculation, Casting Shakeout, & Sand Handling and Cooling Baghouse	PM_{10} VOC CO	5.6 14.4 11.9	24.4 15.1 12.5
03	Casting Shot Blast and Grinding Baghouse	PM_{10}	5.2	22.6
04	Sand Silo with Baghouse	PM_{10}	0.1	0.3
04a	Baghouse Dust Silo	PM_{10}	0.1	0.3
05	Bond Silo with Baghouse	PM_{10}	0.1	0.3
06a	Iron Scrap Handling and Preheater	PM_{10} VOC NO_x CO	0.1 0.1 0.6 0.5	0.2 0.2 2.4 2.0
07	Induction Melting and Holding Furnaces	PM_{10} VOC CO Lead	11.5 0.4 1.7 0.07	12.1 0.4 1.8 0.07
08	Hunter Mold, Pour Off, & Cooling Ventilation	PM_{10} SO_2 VOC NO_x CO	2.4 0.1 0.8 0.1 14.4	2.5 0.1 0.8 0.1 15.1
10	BMM Molding, Pour-Off, & Cooling Gen. Ventilation	PM_{10} SO_2 VOC NO_x CO	5.6 0.2 1.7 0.1 33.6	5.9 0.2 1.8 0.1 35.2
11	Cleaning Room General Ventilation	PM_{10}	2.1	2.2
12	Casting Shakeout & Sand Hauling Areas General Ventilation	PM_{10} VOC CO	0.5 0.2 0.2	0.6 0.2 0.2

SN	Description	Pollutant	lb/hr	tpy
13	Spray Paint Booth	PM_{10} VOC	0.7 23.6	0.5 18.0
14	Powder Coating Operations	PM_{10} VOC NO_x CO	0.1 15.8 0.1 0.1	0.1 5.2 0.3 0.2
15	Heat Treat Furnace	PM_{10} SO_2 VOC CO NO_x lead	0.1 0.1 0.1 0.4 0.5 0.001	0.2 0.1 0.2 1.8 2.1 0.01
16	Spray Paint Booth	PM_{10} VOC	1.0 31.6	0.2 7.7
17	Rubber Mold Post Cure Oven	PM_{10} SO_2 VOC CO NO_x	0.1 0.1 0.1 0.1 0.1	0.1 0.1 0.1 0.2 0.2
18	Shot Blasting Operations Baghouse	PM_{10}	0.4	1.7
19	Disk Preparation Operations Baghouse	PM_{10}	0.3	1.2
21	Burn-Off Oven	PM_{10} SO_2 VOC CO NO_x	0.1 0.1 5.6 0.3 0.3	0.1 0.1 13.9 1.1 1.4
25	Rubber Mold Coating Operations	VOC	16.2	12.2
26	Liquid Solvent Degreasing	VOC	0.6	0.1
27	Grinding, Machining, and Tooling Baghouse	PM_{10}	0.4	1.4
29	Isocure Core Room Scrubber	PM_{10} VOC	0.2 12.0	0.2 2.1
32	Sinto Core Machine			
29a	PUNB Core-Making	VOC	5.7	2.0
30	Shot Blasting Operation Baghouse	PM_{10}	0.3	1.2
31	Pattern Shop and Core Storage	VOC	0.4	1.7

2. The permittee shall not exceed the emission rates set forth in the following table. [Regulation 18, §18.801, effective February 15, 1999, and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

SN	Description	Pollutant	lb/hr	tpy
01	Charge Preheat, Metal Inoculation, Casting Shakeout, & Sand Handling and Cooling	PM Benzene Formaldehyde Naphthalene Toluene 1-methylnaphthalene Acetaldehyde Ethylbenzene Cumeme Propanol Xylene Cresol Phenol Styrene Polycyclic Organic Matter	5.6 2.7 0.1 0.14 1.3 0.05 0.12 0.14 0.04 0.03 1.0 0.08 0.28 0.07 0.15	24.4 2.8 0.1 0.15 1.4 0.05 0.12 0.15 0.04 0.03 1.0 0.08 0.28 0.07 0.07
03	Casting Shot Blast and Grinding	PM	5.2	22.6
04	Sand Silo with Baghouse	PM	0.1	0.3
04a	Baghouse Dust Silo	PM	0.1	0.3
05	Bond Silo with Baghouse	PM	0.1	0.3
06a	Iron Scrap Handling and Preheater	PM	0.1	0.3
07	Induction Melting and Holding Furnaces	PM Manganese	11.5 0.05	12.1 0.05
08	Hunter Mold, Pour Off, & Cooling Ventilation	PM	2.4	2.5
10	BMM Molding, Pour-Off, & Cooling Gen. Ventilation	PM	5.6	5.9
11	Cleaning Room General Ventilation	PM	3.0	3.1
12	Casting Shakeout & Sand Hauling Areas General Ventilation	PM	1.9	2.0

SN	Description	Pollutant	lb/hr	tpy
13	Spray Paint Booth	PM HAPs (including sources 14 and 16)	0.7 51.0	0.6 10
14	Powder Coating Operations	PM HAPs (see SN-13)	0.1	0.1
15	Heat Treat Furnace	PM	0.1	0.2
16	Spray Paint Booth	PM HAPs (see SN-13)	1.0	0.3
17	Rubber Mold Post Cure Oven	PM	0.1	0.1
18	Shot Blasting Operations	PM	0.4	1.7
19	Disk Preparation Operations	PM	0.3	1.2
21	Burn-Off Oven	PM	0.1	0.1
25	Rubber Mold Coating Operations	Ethyl Benzene Hexane Xylene Methanol	2.9 8.8 12.6 13.6	0.6 2.2 2.6 1.5
27	Grinding, Machining, and Tooling	PM	0.4	1.4
29	Isocure Core Room Scrubber	PM Triethyl Amine	0.2 0.4	0.2 0.1
32	Sinto Core Machine			
30	Shot Blasting Operation	PM	0.3	1.2
31	Pattern Shop and Core Storage	PM	0.4	1.7

3. Visible emissions may not exceed the limits specified in the following table of this permit as measured by EPA Reference Method 9. [A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

SN	Limit	Regulatory Citation
06a, 07, 08, 10, 11, 12, 15	20%	§19.503

01, 03, 04, 04a, 05, 13, 14, 16, 17, 18, 19, 21, 29, 30, 31, 32	5%	§18.501

4. The permittee shall not cause or permit the emission of air contaminants, including odors or water vapor and including an air contaminant whose emission is not otherwise prohibited by Regulation #18, if the emission of the air contaminant constitutes air pollution within the meaning of A.C.A. §8-4-303. [Regulation 18, §18.801 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

5. The permittee shall not conduct operations in such a manner as to unnecessarily cause air contaminants and other pollutants to become airborne. [Regulation 18, §18.901 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

6. Pursuant to §19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311, the permittee shall not melt more than 25,200 tons of iron in the induction furnaces, SN-07, in any consecutive 12 month period. Compliance with this condition will be shown by Specific Condition 7.

7. Pursuant to §19.705 and 40 CFR Part 52, Subpart E, the permittee shall maintain records of the iron melted in the induction furnaces, SN-07, each month. The permittee shall also keep records of the 12 month rolling total of iron processed. These records shall be kept on site, and shall be made available to Department personnel upon request.

8. Pursuant to §19.702 and 40 CFR Part 52, Subpart E, the permittee shall measure the particulate and PM_{10} emissions from the baghouse D-3, SN-03, within 180 days of the issuance of this permit. These tests shall be conducted in accordance with General Condition 7.

9. Pursuant to §19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311, the permittee shall not use a paint or thinner in SN-13, SN-14, or SN-16 with a VOC content greater than listed in the following table. Compliance will be shown by Specific Condition 12.

Source Number	VOC Content Limit (lb/gal)	
	Paint	Thinner
SN-13	4.92	7.20

SN-14	5.78	7.20
SN-16	6.58	7.20

10. Pursuant to §19.1004 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311, the permittee shall not use a paint or thinner in SN-13, SN-14, or SN-16 with a HAP content greater than listed in the following table. The coating limits listed are as applied. Thinner usage is for clean up only. Compliance will be shown by Specific Condition 13.

Coatings Table		Thinners Table	
Minimum TLV	Maximum HAP Content	Minimum TLV	Maximum HAP Content
381.40	7.5	151.20	7.5
358.80	7.0	147.70	7.0
336.10	6.5	144.30	6.5
317.90	6.0	141.10	6.0
290.90	5.5	137.20	5.5
270.30	5.0	134.00	5.0
253.00	4.5	130.70	4.5
235.60	4.0	127.10	4.0
218.20	3.5	123.60	3.5
200.80	3.0	120.20	3.0
183.40	2.5	116.80	2.5
166.40	2.0	113.30	2.0
149.90	1.5	109.90	1.5
132.70	1.0	106.40	1.0
116.10	0.5	103.00	0.5
107.90	0.25	101.30	0.25

11. The permittee shall maintain VOC records of all paint and thinners used in SN-13, 14, and 16. The permittee shall maintain records which include the name of each VOC containing material used in SN-13, 14, and 16, and the amount of each VOC containing material used. The permittee shall maintain monthly records which include the monthly total of VOC emitted, the content of VOC in the material in pounds per gallon as verified by manufactures MSDS sheets or equivalent, and the consecutive 12 month total of each VOC emitted. The monthly records shall be updated by the 15th day of the month following the month the records represent. [§19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

12. The permittee shall maintain records of HAP emissions. The permittee shall maintain records which include the name of each HAP containing material used in SN-13, 14, and 16 and the amount of each HAP containing material used. The permittee shall maintain monthly records which include the monthly total of each HAP emitted, the content of each HAP in the material in pounds per gallon as verified by manufactures MSDS sheets or equilivant, the TLV of each HAP used, the consecutive 12 month total of each HAP emitted, and the consecutive 12 month total of emissions of all HAPs combined. The monthly records shall be updated by the 15th day of the month following the month the records represent. [§18.1004 of Regulation 18 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

13. The permittee shall not use an adhesive in SN-25 with a VOC content greater than 6.35 lb/gal or a release agent with a VOC content greater than 6.95 lb/gal. Compliance will be shown by Specific Condition 16. [§19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

14. The permittee shall not use an adhesive in SN-25 with a Ethyl Benzene content greater than 1.3 lb/gal or a Xylene content greater than 5.45 lb/gal. The permittee shall not use a release agent with a Hexane content greater than 3.74 lb/gal. Compliance will be shown by Specific Condition 17. [§19.1004 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

15. The permittee shall maintain monthly VOC records of all VOC containing materials used in SN-25. These records shall include the name of the material, the VOC content of the material as verified by manufacturers MSDS or equivalent, and the 12 month rolling total of VOC emissions from SN-25. These records shall be updated by the 15th day of the month following the month which the records represent. [§19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

16. The permittee shall maintain records of HAP emissions from SN-25. The permittee shall maintain records which include the name of each HAP containing material used in SN-25, the content of each HAP in the material in weight percent, and the amount of each HAP containing material used. The permittee shall maintain monthly records which include the monthly total of each HAP emitted, the consecutive 12 month total of each HAP emitted, and the consecutive 12 month total of emissions of all HAPs combined. The monthly records shall be updated by the 15th day of the month following the month the records represent. [§18.1004 of Regulation 18 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

17. The permittee shall not use a binder in Phenolic Urethane No-bake process, SN-29a, with a VOC content greater than 3.62 lb/gal, and the permittee shall not use a binder in PUCB process SN-29 and SN-32, with a VOC content greater than 4.24 lb/gal. The catalysis used in the processes are 100% VOC by weight. Compliance with this condition will be shown by Specific Condition 19. The permittee uses a catalyst which is 100% Triethyl amine. [§19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

18. The permittee shall maintain monthly VOC records of all binders purchased for use in Phenolic Urethane No-bake process, SN-29a and the PUCB process, SN-29 and SN-32. These records shall include the name of the binder, the VOC content of the binder as verified by manufacturers MSDS or equivalent, and the 12 month rolling total of VOC emissions from the Phenolic Urethane No-bake process, SN-29 and the PUCB process, SN-32. These records shall be updated by the 15th day of the month following the month which the records represent. [§19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

19. The permittee shall not emit more than 17.3 tons of all HAPs combined from sources SN-13, 14, 16, and 25 in any consecutive 12 month period. The permittee shall maintain records of the total of HAPs emitted from sources SN-13, 14, 16, and 25 each month and consecutive 12 month total of HAPs emitted from these sources. These records shall be updated by the 15th day of the month following the month which the records represent. [§19.405(B) of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

20. The permittee shall not emit more than 9.9 tons of any single HAPs or 24.9 tpy of all HAPs combined from the facility in any consecutive 12 month period. The permittee shall maintain records of the total consecutive 12 month emissions of every single HAP emitted from the facility. These records shall be updated by the 15th day of the month following the month which the records represent. [§19.405(B) of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

21. The permittee shall operate the afterburner on SN-21 whenever the unit is operating and must maintain a minimum temperature greater than 1400ºF at SN-21 whenever the unit is in operation. The permittee must maintain daily records of the temperature of SN-21. These records shall be kept on site and made available to Department personnel upon request. [§19.705 of Regulation 19 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Section V: INSIGNIFICANT ACTIVITIES

The Department deems the following types of activities or emissions as insignificant on the basis of size, emission rate, production rate, or activity in accordance with Group A of the Insignificant Activities list found in Regulation 18 and 19 Appendix A. Insignificant activity emission determinations rely upon the information submitted by the permittee in an application dated September 9, 1997.

Description	Category
Metal Preheater Gas Combustion Exhaust Vent Post Cure Oven BBC Preheater Casting Preheat Ovens Ladle preheaters (3) Casting Preheat Oven in Powder Coating Building	A-1
Facility Laboratory	A-5
Pressurized Propane Storage Tank	A-13
Forklifts	B-1
Hand Held Machining Equipment	B-17
Parking Areas and Roadways	A-13

Section VI: GENERAL CONDITIONS

1. Any terms or conditions included in this permit that specify and reference Arkansas Pollution Control & Ecology Commission Regulation 18 or the Arkansas Water and Air Pollution Control Act (A.C.A. §8-4-101 et seq.) as the sole origin of and authority for the terms or conditions are not required under the Clean Air Act or any of its applicable requirements, and are not federally enforceable under the Clean Air Act. Arkansas Pollution Control & Ecology Commission Regulation 18 was adopted pursuant to the Arkansas Water and Air Pollution Control Act (A.C.A. §8-4-101 et seq.). Any terms or conditions included in this permit that specify and reference Arkansas Pollution Control & Ecology Commission Regulation 18 or the Arkansas Water and Air Pollution Control Act (A.C.A. §8-4-101 et seq.) as the origin of and authority for the terms or conditions are enforceable under this Arkansas statute.

2. This permit does not relieve the owner or operator of the equipment and/or the facility from compliance with all applicable provisions of the Arkansas Water and Air Pollution Control Act and the regulations promulgated under the Act. [A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

3. The permittee will notify the Department in writing within thirty (30) days after commencement of construction, completion of construction, first operation of equipment and/or facility, and first attainment of the equipment and/or facility target production rate. [Regulation 19, §19.704 and/or A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

4. Construction or modification must commence within eighteen (18) months from the date of permit issuance. [Regulation 19, §19.410(B) and/or Regulation 18, §18.309(B) and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

5. The permittee must keep records for five years to enable the Department to determine compliance with the terms of this permit such as hours of operation, throughput, upset conditions, and continuous monitoring data. The Department may use the records, at the discretion of the Department, to determine compliance with the conditions of the permit. [Regulation 19, §19.705 and/or Regulation 18, §18.1004 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

6. A responsible official must certify any reports required by any condition contained in this permit and submit any reports to the Department at the address below. [Regulation 19, §19.705 and/or Regulation 18, §18.1004 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

   Arkansas Department of Environmental Quality
   Air Division
   ATTN: Compliance Inspector Supervisor
   Post Office Box 8913

Little Rock, AR 72219

7. The permittee will test any equipment scheduled for testing, unless stated in the Specific Conditions of this permit or by any federally regulated requirements, within the following time frames: (1) newly constructed or modified equipment within sixty (60) days of achieving the maximum production rate, but no later than 180 days after initial start up of the permitted source or (2) existing equipment already operating according to the time frames set forth by the Department. The permittee must notify the Department of the scheduled date of compliance testing at least fifteen (15) days in advance of such test. The permittee must submit compliance test results to the Department within thirty (30) days after the completion of testing. [Regulation 19, §19.702 and/or Regulation 18, §18.1002 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

8. The permittee will provide: [Regulation 19 , §19.702 and/or Regulation 18 , §18.1002 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

    a. Sampling ports adequate for applicable test methods
    b. Safe sampling platforms
    c. Safe access to sampling platforms
    d. Utilities for sampling and testing equipment

9. The permittee will operate equipment, control apparatus and emission monitoring equipment within their design limitations. The permittee will maintain in good condition at all times equipment, control apparatus and emission monitoring equipment. [Regulation 19, §19.303 and/or Regulation 18, §18.1104 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

10. If the permittee exceeds an emission limit established by this permit, the permittee will be deemed in violation of said permit and will be subject to enforcement action. The Department may forego enforcement action for emissions exceeding any limits established by this permit provided the following requirements are met: [Regulation 19, §19.601 and/or Regulation 18, §18.1101 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

    a. The permittee demonstrates to the satisfaction of the Department that the emissions resulted from an equipment malfunction or upset and are not the result of negligence or improper maintenance, and the permittee took all reasonable measures to immediately minimize or eliminate the excess emissions.
    b. The permittee reports the occurrence or upset or breakdown of equipment (by telephone, facsimile, or overnight delivery) to the Department by the end of the next business day after the occurrence or the discovery of the occurrence.
    c. The permittee must submit to the Department, within five business days after the occurrence or the discovery of the occurrence, a full, written report of such occurrence, including a statement of all known causes and of the scheduling and nature of the actions to be taken to minimize or eliminate future occurrences,

including, but not limited to, action to reduce the frequency of occurrence of such conditions, to minimize the amount by which said limits are exceeded, and to reduce the length of time for which said limits are exceeded. If the information is included in the initial report, the information need not be submitted again.

11. The permittee shall allow representatives of the Department upon the presentation of credentials: [A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

    a. To enter upon the permittee's premises, or other premises under the control of the permittee, where an air pollutant source is located or in which any records are required to be kept under the terms and conditions of this permit;
    b. To have access to and copy any records required to be kept under the terms and conditions of this permit, or the Act;
    c. To inspect any monitoring equipment or monitoring method required in this permit;
    d. To sample any emission of pollutants; and
    e. To perform an operation and maintenance inspection of the permitted source.

12. The Department issued this permit in reliance upon the statements and presentations made in the permit application. The Department has no responsibility for the adequacy or proper functioning of the equipment or control apparatus. [A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

13. The Department may revoke or modify this permit when, in the judgment of the Department, such revocation or modification is necessary to comply with the applicable provisions of the Arkansas Water and Air Pollution Control Act and the regulations promulgated the Arkansas Water and Air Pollution Control Act. [Regulation 19, §19.410(A) and/or Regulation 18, §18.309(A) and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

14. This permit may be transferred. An applicant for a transfer must submit a written request for transfer of the permit on a form provided by the Department and submit the disclosure statement required by Arkansas Code Annotated '8 1 106 at least thirty (30) days in advance of the proposed transfer date. The permit will be automatically transferred to the new permittee unless the Department denies the request to transfer within thirty (30) days of the receipt of the disclosure statement. The Department may deny a transfer on the basis of the information revealed in the disclosure statement or other investigation or, deliberate falsification or omission of relevant information. [Regulation 19, §19.407(B) and/or Regulation 18, §18.307(B) and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

15. This permit shall be available for inspection on the premises where the control apparatus is located. [A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

16. This permit authorizes only those pollutant emitting activities addressed herein. [A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

17. This permit supersedes and voids all previously issued air permits for this facility. [Regulation 18 and 19 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

18. The permittee must pay all permit fees in accordance with the procedures established in Regulation No. 9. [A.C.A §8-1-105(c)]

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

EFFECTIVE DATE: January 14, 2015

ISSUED TO

Asama Coldwater Manufacturing, Inc.
and
Gokoh Coldwater, Inc.

State Registration Number (SRN): N5814

LOCATED AT
180 Asama Parkway, Coldwater, Michigan 49036
100 Concept Drive, Coldwater, Michigan 49036

RENEWABLE OPERATING PERMIT

Permit Number: MI-ROP-N5814-2015

Expiration Date: January 14, 2020

Administratively Complete ROP Renewal Application Due Between July 14, 2018 and July 14, 2019

This Renewable Operating Permit (ROP) is issued in accordance with and subject to Section 5506(3) of Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451). Pursuant to Michigan Air Pollution Control Rule 210(1), this ROP constitutes the permittee's authority to operate the stationary source identified above in accordance with the general conditions, special conditions and attachments contained herein. Operation of the stationary source and all emission units listed in the permit are subject to all applicable future or amended rules and regulations pursuant to Act 451 and the federal Clean Air Act.

SOURCE-WIDE PERMIT TO INSTALL

Permit Number: MI-PTI-N5814-2015

This Permit to Install (PTI) is issued in accordance with and subject to Section 5505(5) of Act 451. Pursuant to Michigan Air Pollution Control Rule 214a, the terms and conditions herein, identified by the underlying applicable requirement citation of Rule 201(1)(a), constitute a federally enforceable PTI. The PTI terms and conditions do not expire and remain in effect unless the criteria of Rule 201(6) are met. Operation of all emission units identified in the PTI is subject to all applicable future or amended rules and regulations pursuant to Act 451 and the federal Clean Air Act.

Michigan Department of Environmental Quality

Mary A. Douglas, Kalamazoo District Supervisor

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AUTHORITY AND ENFORCEABILITY

For the purpose of this permit, the **permittee** is defined as any person who owns or operates an emission unit at a stationary source for which this permit has been issued. The **department** is defined in Rule 104(d) as the Director of the Michigan Department of Environmental Quality (MDEQ) or his or her designee.

The permittee shall comply with all specific details in the permit terms and conditions and the cited underlying applicable requirements. All terms and conditions in this ROP are both federally enforceable and state enforceable unless otherwise footnoted. Certain terms and conditions are applicable to most stationary sources for which an ROP has been issued. These general conditions are included in Part A of this ROP. Other terms and conditions may apply to a specific emission unit, several emission units which are represented as a flexible group, or the entire stationary source which is represented as a Source-Wide group. Special conditions are identified in Parts B, C, D and/or the appendices.

In accordance with Rule 213(2)(a), all underlying applicable requirements will be identified for each ROP term or condition. All terms and conditions that are included in a PTI, are streamlined or subsumed, or is state only enforceable will be noted as such.

In accordance with Section 5507 of Act 451, the permittee has included in the ROP application a compliance certification, a schedule of compliance, and a compliance plan. For applicable requirements with which the source is in compliance, the source will continue to comply with these requirements. For applicable requirements with which the source is not in compliance, the source will comply with the detailed schedule of compliance requirements that are incorporated as an appendix in this ROP. Furthermore, for any applicable requirements effective after the date of issuance of this ROP, the stationary source will meet the requirements on a timely basis, unless the underlying applicable requirement requires a more detailed schedule of compliance.

Issuance of this permit does not obviate the necessity of obtaining such permits or approvals from other units of government as required by law.

Section 1 – Asama Coldwater Manufacturing, Inc.

A. GENERAL CONDITIONS

Permit Enforceability

- All conditions in this permit are both federally enforceable and state enforceable unless otherwise noted. **(R 336.1213(5))**

- Those conditions that are hereby incorporated in a state-only enforceable Source-Wide PTI pursuant to Rule 201(2)(d) are designated by footnote one. **(R 336.1213(5)(a), R 336.1214a(5))**

- Those conditions that are hereby incorporated in a federally enforceable Source-Wide PTI pursuant to Rule 201(2)(c) are designated by footnote two. **(R 336.1213(5)(b), R 336.1214a(3))**

General Provisions

1. The permittee shall comply with all conditions of this ROP. Any ROP noncompliance constitutes a violation of Act 451, and is grounds for enforcement action, for ROP revocation or revision, or for denial of the renewal of the ROP. All terms and conditions of this ROP that are designated as federally enforceable are enforceable by the Administrator of the United States Environmental Protection Agency (USEPA) and by citizens under the provisions of the federal Clean Air Act (CAA). Any terms and conditions based on applicable requirements which are designated as "state only" are not enforceable by the USEPA or citizens pursuant to the CAA. **(R 336.1213(1)(a))**

2. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this ROP. **(R 336.1213(1)(b))**

3. This ROP may be modified, revised, or revoked for cause. The filing of a request by the permittee for a permit modification, revision, or termination, or a notification of planned changes or anticipated noncompliance does not stay any ROP term or condition. This does not supersede or affect the ability of the permittee to make changes, at the permittee's own risk, pursuant to Rule 215 and Rule 216. **(R 336.1213(1)(c))**

4. The permittee shall allow the department, or an authorized representative of the department, upon presentation of credentials and other documents as may be required by law and upon stating the authority for and purpose of the investigation, to perform any of the following activities **(R 336.1213(1)(d))**:
   a. Enter, at reasonable times, a stationary source or other premises where emissions-related activity is conducted or where records must be kept under the conditions of the ROP.
   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the ROP.
   c. Inspect, at reasonable times, any of the following:
      i. Any stationary source.
      ii. Any emission unit.
      iii. Any equipment, including monitoring and air pollution control equipment.
      iv. Any work practices or operations regulated or required under the ROP.
   d. As authorized by Section 5526 of Act 451, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the ROP or applicable requirements.

5. The permittee shall furnish to the department, within a reasonable time, any information the department may request, in writing, to determine whether cause exists for modifying, revising, or revoking the ROP or to determine compliance with this ROP. Upon request, the permittee shall also furnish to the department copies of any records that are required to be kept as a term or condition of this ROP. For information which is claimed by the permittee to be confidential, consistent with the requirements of the 1976 PA 442, MCL §15.231 et seq., and known as the Freedom of Information Act, the person may also be required to furnish the records directly to the USEPA together with a claim of confidentiality. **(R 336.1213(1)(e))**

6. A challenge by any person, the Administrator of the USEPA, or the department to a particular condition or a part of this ROP shall not set aside, delay, stay, or in any way affect the applicability or enforceability of any other condition or part of this ROP. **(R 336.1213(1)(f))**

7. The permittee shall pay fees consistent with the fee schedule and requirements pursuant to Section 5522 of Act 451. **(R 336.1213(1)(g))**

8. This ROP does not convey any property rights or any exclusive privilege. **(R 336.1213(1)(h))**

Equipment & Design

9. Any collected air contaminants shall be removed as necessary to maintain the equipment at the required operating efficiency. The collection and disposal of air contaminants shall be performed in a manner so as to minimize the introduction of contaminants to the outer air. Transport of collected air contaminants in Priority I and II areas requires the use of material handling methods specified in Rule 370(2). **(R 336.1370)**

10. Any air cleaning device shall be installed, maintained, and operated in a satisfactory manner and in accordance with the Michigan Air Pollution Control rules and existing law. **(R 336.1910)**

Emission Limits

11. Except as provided in Subrules 2, 3, and 4 of Rule 301, states in part; "a person shall not cause or permit to be discharged into the outer air from a process or process equipment a visible emission of a density greater than the most stringent of Rule 301(1)(a) or (b) unless otherwise specified in this ROP." The grading of visible emissions shall be determined in accordance with Rule 303 **(R 336.1301(1) in pertinent part)**:
    a. A 6-minute average of 20 percent opacity, except for one 6-minute average per hour of not more than 27 percent opacity.
    b. A limit specified by an applicable federal new source performance standard.

12. The permittee shall not cause or permit the emission of an air contaminant or water vapor in quantities that cause, alone or in reaction with other air contaminants, either of the following:
    a. Injurious effects to human health or safety, animal life, plant life of significant economic value, or property.[1] **(R 336.1901(a))**
    b. Unreasonable interference with the comfortable enjoyment of life and property.[1] **(R 336.1901(b))**

Testing/Sampling

13. The department may require the owner or operator of any source of an air contaminant to conduct acceptable performance tests, at the owner's or operator's expense, in accordance with Rule 1001 and Rule 1003, under any of the conditions listed in Rule 1001(1). **(R 336.2001)**

14. Any required performance testing shall be conducted in accordance with Rule 1001(2), Rule 1001(3) and Rule 1003. **(R 336.2001(2), R 336.2001(3), R 336.2003(1))**

15. Any required test results shall be submitted to the Air Quality Division (AQD) in the format prescribed by the applicable reference test method within 60 days following the last date of the test. **(R 336.2001(4))**

Monitoring/Recordkeeping

16. Records of any periodic emission or parametric monitoring required in this ROP shall include the following information specified in Rule 213(3)(b)(i), where appropriate **(R 336.1213(3)(b))**:
    a. The date, location, time, and method of sampling or measurements.
    b. The dates the analyses of the samples were performed.
    c. The company or entity that performed the analyses of the samples.
    d. The analytical techniques or methods used.
    e. The results of the analyses.
    f. The related process operating conditions or parameters that existed at the time of sampling or measurement.

17. All required monitoring data, support information and all reports, including reports of all instances of deviation from permit requirements, shall be kept and furnished to the department upon request for a period of not less than 5 years from the date of the monitoring sample, measurement, report or application. Support information includes all calibration and maintenance records and all original strip-chart recordings, or other original data records, for continuous monitoring instrumentation and copies of all reports required by the ROP. **(R 336.1213(1)(e), R 336.1213(3)(b)(ii))**

Certification & Reporting

18. Except for the alternate certification schedule provided in Rule 213(3)(c)(iii)(B), any document required to be submitted to the department as a term or condition of this ROP shall contain an original certification by a Responsible Official which states that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete. **(R 336.1213(3)(c))**

19. A Responsible Official shall certify to the appropriate AQD District Office and to the USEPA that the stationary source is and has been in compliance with all terms and conditions contained in the ROP except for deviations that have been or are being reported to the appropriate AQD District Office pursuant to Rule 213(3)(c). This certification shall include all the information specified in Rule 213(4)(c)(i) through (v) and shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the certification are true, accurate, and complete. The USEPA address is: USEPA, Air Compliance Data - Michigan, Air and Radiation Division, 77 West Jackson Boulevard, Chicago, Illinois 60604. **(R 336.1213(4)(c))**

20. The certification of compliance shall be submitted annually for the term of this ROP as detailed in the special conditions, or more frequently if specified in an applicable requirement or in this ROP. **(R 336.1213(4)(c))**

21. The permittee shall promptly report any deviations from ROP requirements and certify the reports. The prompt reporting of deviations from ROP requirements is defined in Rule 213(3)(c)(ii) as follows, unless otherwise described in this ROP **(R 336.1213(3)(c))**:
    a. For deviations that exceed the emissions allowed under the ROP, prompt reporting means reporting consistent with the requirements of Rule 912 as detailed in Condition 25. All reports submitted pursuant to this paragraph shall be promptly certified as specified in Rule 213(3)(c)(iii).
    b. For deviations which exceed the emissions allowed under the ROP and which are not reported pursuant to Rule 912 due to the duration of the deviation, prompt reporting means the reporting of all deviations in the semiannual reports required by Rule 213(3)(c)(i). The report shall describe reasons for each deviation and the actions taken to minimize or correct each deviation.
    c. For deviations that do not exceed the emissions allowed under the ROP, prompt reporting means the reporting of all deviations in the semiannual reports required by Rule 213(3)(c)(i). The report shall describe the reasons for each deviation and the actions taken to minimize or correct each deviation.

22. For reports required pursuant to Rule 213(3)(c)(ii), prompt certification of the reports is described in Rule 213(3)(c)(iii) as either of the following **(R 336.1213(3)(c))**:
    a. Submitting a certification by a Responsible Official with each report which states that, based on information and belief formed after reasonable inquiry, the statements and information in the report are true, accurate, and complete.
    b. Submitting, within 30 days following the end of a calendar month during which one or more prompt reports of deviations from the emissions allowed under the ROP were submitted to the department pursuant to Rule 213(3)(c)(ii), a certification by a Responsible Official which states that, "based on information and belief formed after reasonable inquiry, the statements and information contained in each of the reports submitted during the previous month were true, accurate, and complete". The certification shall include a listing of the reports that are being certified. Any report submitted pursuant to Rule 213(3)(c)(ii) that will be certified on a monthly basis pursuant to this paragraph shall include a statement that certification of the report will be provided within 30 days following the end of the calendar month.

23. Semiannually for the term of the ROP as detailed in the special conditions, or more frequently if specified, the permittee shall submit certified reports of any required monitoring to the appropriate AQD District Office. All instances of deviations from ROP requirements during the reporting period shall be clearly identified in the reports. **(R 336.1213(3)(c)(i))**

24. On an annual basis, the permittee shall report the actual emissions, or the information necessary to determine the actual emissions, of each regulated air pollutant as defined in Rule 212(6) for each emission unit utilizing the emissions inventory forms provided by the department. **(R 336.1212(6))**

25. The permittee shall provide notice of an abnormal condition, start-up, shutdown, or malfunction that results in emissions of a hazardous or toxic air pollutant which continue for more than one hour in excess of any applicable standard or limitation, or emissions of any air contaminant continuing for more than two hours in excess of an applicable standard or limitation, as required in Rule 912, to the appropriate AQD District Office. The notice shall be provided not later than two business days after the start-up, shutdown, or discovery of the abnormal conditions or malfunction. Notice shall be by any reasonable means, including electronic, telephonic, or oral communication. Written reports, if required under Rule 912, must be submitted to the appropriate AQD District Supervisor within 10 days after the start-up or shutdown occurred, within 10 days after the abnormal conditions or malfunction has been corrected, or within 30 days of discovery of the abnormal conditions or malfunction, whichever is first. The written reports shall include all of the information required in Rule 912(5) and shall be certified by a Responsible Official in a manner consistent with the CAA. **(R 336.1912)**

Permit Shield

26. Compliance with the conditions of the ROP shall be considered compliance with any applicable requirements as of the date of ROP issuance, if either of the following provisions is satisfied **(R 336.1213(6)(a)(i), R 336.1213(6)(a)(ii))**:
    a. The applicable requirements are included and are specifically identified in the ROP.
    b. The permit includes a determination or concise summary of the determination by the department that other specifically identified requirements are not applicable to the stationary source.

    Any requirements identified in Part E of this ROP have been identified as non-applicable to this ROP and are included in the permit shield.

27. Nothing in this ROP shall alter or affect any of the following:
    a. The provisions of Section 303 of the CAA, emergency orders, including the authority of the USEPA under Section 303 of the CAA. **(R 336.1213(6)(b)(i))**
    b. The liability of the owner or operator of this source for any violation of applicable requirements prior to or at the time of this ROP issuance. **(R 336.1213(6)(b)(ii))**
    c. The applicable requirements of the acid rain program, consistent with Section 408(a) of the CAA. **(R 336.1213(6)(b)(iii))**

d. The ability of the USEPA to obtain information from a source pursuant to Section 114 of the CAA. **(R 336.1213(6)(b)(iv))**

28. The permit shield shall not apply to provisions incorporated into this ROP through procedures for any of the following:
    a. Operational flexibility changes made pursuant to Rule 215. **(R 336.1215(5))**
    b. Administrative Amendments made pursuant to Rule 216(1)(a)(i)-(iv). **(R 336.1216(1)(b)(iii))**
    c. Administrative Amendments made pursuant to Rule 216(1)(a)(v) until the amendment has been approved by the department. **(R 336.1216(1)(c)(iii))**
    d. Minor Permit Modifications made pursuant to Rule 216(2). **(R 336.1216(2)(f))**
    e. State-Only Modifications made pursuant to Rule 216(4) until the changes have been approved by the department. **(R 336.1216(4)(e))**

29. Expiration of this ROP results in the loss of the permit shield. If a timely and administratively complete application for renewal is submitted not more than 18 months, but not less than 6 months, before the expiration date of the ROP, but the department fails to take final action before the end of the ROP term, the existing ROP does not expire until the renewal is issued or denied, and the permit shield shall extend beyond the original ROP term until the department takes final action. **(R 336.1217(1)(c), R 336.1217(1)(a))**

Revisions

30. For changes to any process or process equipment covered by this ROP that do not require a revision of the ROP pursuant to Rule 216, the permittee must comply with Rule 215. **(R 336.1215, R 336.1216)**

31. A change in ownership or operational control of a stationary source covered by this ROP shall be made pursuant to Rule 216(1). **(R 336.1219(2))**

32. For revisions to this ROP, an administratively complete application shall be considered timely if it is received by the department in accordance with the time frames specified in Rule 216. **(R 336.1210(9))**

33. Pursuant to Rule 216(1)(b)(iii), Rule 216(2)(d) and Rule 216(4)(d), after a change has been made, and until the department takes final action, the permittee shall comply with both the applicable requirements governing the change and the ROP terms and conditions proposed in the application for the modification. During this time period, the permittee may choose to not comply with the existing ROP terms and conditions that the application seeks to change. However, if the permittee fails to comply with the ROP terms and conditions proposed in the application during this time period, the terms and conditions in the ROP are enforceable. **(R 336.1216(1)(c)(iii), R 336.1216(2)(d), R 336.1216(4)(d))**

Reopenings

34. A ROP shall be reopened by the department prior to the expiration date and revised by the department under any of the following circumstances:
    a. If additional requirements become applicable to this stationary source with three or more years remaining in the term of the ROP, but not if the effective date of the new applicable requirement is later than the ROP expiration date. **(R 336.1217(2)(a)(i))**
    b. If additional requirements pursuant to Title IV of the CAA become applicable to this stationary source. **(R 336.1217(2)(a)(ii))**
    c. If the department determines that the ROP contains a material mistake, information required by any applicable requirement was omitted, or inaccurate statements were made in establishing emission limits or the terms or conditions of the ROP. **(R 336.1217(2)(a)(iii))**
    d. If the department determines that the ROP must be revised to ensure compliance with the applicable requirements. **(R 336.1217(2)(a)(iv))**

Renewals

35. For renewal of this ROP, an administratively complete application shall be considered timely if it is received by the department not more than 18 months, but not less than 6 months, before the expiration date of the ROP. **(R 336.1210(7))**

Stratospheric Ozone Protection

36. If the permittee is subject to Title 40 of the Code of Federal Regulations (CFR), Part 82 and services, maintains, or repairs appliances except for motor vehicle air conditioners (MVAC), or disposes of appliances containing refrigerant, including MVAC and small appliances, or if the permittee is a refrigerant reclaimer, appliance owner or a manufacturer of appliances or recycling and recovery equipment, the permittee shall comply with all applicable standards for recycling and emissions reduction pursuant to 40 CFR, Part 82, Subpart F.

37. If the permittee is subject to 40 CFR, Part 82, and performs a service on motor (fleet) vehicles when this service involves refrigerant in the MVAC, the permittee is subject to all the applicable requirements as specified in 40 CFR, Part 82, Subpart B, Servicing of Motor Vehicle Air Conditioners. The term "motor vehicle" as used in Subpart B does not include a vehicle in which final assembly of the vehicle has not been completed by the original equipment manufacturer. The term MVAC as used in Subpart B does not include the air-tight sealed refrigeration system used for refrigerated cargo or an air conditioning system on passenger buses using Hydrochlorofluorocarbon-22 refrigerant.

Risk Management Plan

38. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall register and submit to the USEPA the required data related to the risk management plan for reducing the probability of accidental releases of any regulated substances listed pursuant to Section 112(r)(3) of the CAA as amended in 40 CFR 68.130. The list of substances, threshold quantities, and accident prevention regulations promulgated under 40 CFR, Part 68, do not limit in any way the general duty provisions under Section 112(r)(1).

39. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall comply with the requirements of 40 CFR, Part 68, no later than the latest of the following dates as provided in 40 CFR 68.10(a):
    a. June 21, 1999,
    b. Three years after the date on which a regulated substance is first listed under 40 CFR 68.130, or
    c. The date on which a regulated substance is first present above a threshold quantity in a process.

40. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall submit any additional relevant information requested by any regulatory agency necessary to ensure compliance with the requirements of 40 CFR, Part 68.

41. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall annually certify compliance with all applicable requirements of Section 112(r) as detailed in Rule 213(4)(c)). **(40 CFR, Part 68)**

Emission Trading

42. Emission averaging and emission reduction credit trading are allowed pursuant to any applicable interstate or regional emission trading program that has been approved by the Administrator of the USEPA as a part of Michigan's State Implementation Plan. Such activities must comply with Rule 215 and Rule 216. **(R 336.1213(12))**

Permit To Install (PTI)

43. The process or process equipment included in this permit shall not be reconstructed, relocated, or modified unless a PTI authorizing such action is issued by the department, except to the extent such action is exempt from the PTI requirements by any applicable rule. [2] **(R 336.1201(1))**

44. The department may, after notice and opportunity for a hearing, revoke PTI terms or conditions if evidence indicates the process or process equipment is not performing in accordance with the terms and conditions of the PTI or is violating the department's rules or the CAA. [2] **(R 336.1201(8), Section 5510 of Act 451)**

45. The terms and conditions of a PTI shall apply to any person or legal entity that now or hereafter owns or operates the process or process equipment at the location authorized by the PTI. If a new owner or operator submits a written request to the department pursuant to Rule 219 and the department approves the request, this PTI will be amended to reflect the change of ownership or operational control. The request must include all of the information required by Subrules (1)(a), (b) and (c) of Rule 219. The written request shall be sent to the appropriate AQD District Supervisor, MDEQ. [2] **(R 336.1219)**

46. If the installation, reconstruction, relocation, or modification of the equipment for which PTI terms and conditions have been approved has not commenced within 18 months, or has been interrupted for 18 months, the applicable terms and conditions from that PTI shall become void unless otherwise authorized by the department. Furthermore, the person to whom that PTI was issued, or the designated authorized agent, shall notify the department via the Supervisor, Permit Section, MDEQ, AQD, P. O. Box 30260, Lansing, Michigan 48909, if it is decided not to pursue the installation, reconstruction, relocation, or modification of the equipment allowed by the terms and conditions from that PTI. [2] **(R 336.1201(4))**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

B. SOURCE-WIDE CONDITIONS

Part B outlines the Source-Wide Terms and Conditions that apply to this stationary source. The permittee is subject to these special conditions for the stationary source in addition to the general conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply to this source, NA (not applicable) has been used in the table. If there are no Source-Wide Conditions, this section will be left blank.

C. EMISSION UNIT CONDITIONS

Part C outlines terms and conditions that are specific to individual emission units listed in the Emission Unit Summary Table. The permittee is subject to the special conditions for each emission unit in addition to the General Conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply, NA (not applicable) has been used in the table. If there are no conditions specific to individual emission units, this section will be left blank.

EMISSION UNIT SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EUMPCC-S1	Metal melting, pouring, and casting cooling process equipment with two electric induction furnaces with a combined daily average melting capacity of 8 tons per hour. Emissions from these processes are controlled by a 49,000 dscfm baghouse.	06/17/97 02/25/04	FGFOUNDRY-S1 FGCAM_UNITS-S1
EUSANDSYSTEM-S1	Mold making, shakeout, and sand processing equipment. Emissions from these processes are controlled by a 66,000 dscfm baghouse.	06/17/97 02/25/04	FGFOUNDRY-S1 FGCAM_UNITS-S1
EUSHOTBLAST-S1	A shotblast machine with a mechanical pre-cleaner followed by a 7,500 scfm baghouse that vents outside on or after August 14, 2006.	06/17/97 08/14/06	NA
EU-MP-S1	Consists of two electric induction melting furnaces with an 11 ton holding capacity each, and a monorail pouring station with three ladles. Emissions from melting and pouring processes are controlled by associated hoods, enclosures, ductwork, and a 37,500 acfm baghouse.	12/01/07 NA	FG-NEWFOUNDRY-S1
EU-MCS-S1	Consists of the automated mold cooling conveyors and automated sand shakeout lines, including a flat deck shakeout system. Emissions from these processes are controlled by associated hoods, enclosures, ductwork, a baghouse, and a regenerative thermal oxidizer. The exhaust gas flow from this unit is approximately 61,200 acfm.	01/01/07 06/20/13	FG-NEWFOUNDRY-S1 FGCAM_UNITS-S1
EU-SS-S1	Consists of the molding machine and related sand handling equipment. Emissions from the mold making process are controlled by associated hoods, enclosures, ductwork, and a 56,900 acfm baghouse.	12/01/07	FG-NEWFOUNDRY-S1 FGCAM_UNITS-S1
EU-CCFBACK-S1	Consists of the back section of casting cooling conveyors and a shot blast machine. Emissions from this emission unit are controlled by associated hoods, enclosures, ductwork, and a 65,360 acfm baghouse.	12/01/07	FG-NEWFOUNDRY-S1 FGCAM_UNITS-S1

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EUCOLDCLEANER-S1	Any cold cleaner that is grandfathered or exempt from Rule 201 pursuant to Rule 281(h), or Rule 285(r)(iv). Existing cold cleaners were placed into operation prior to July 1, 1979. New cold cleaners were placed into operation on or after July 1, 1979.	06/17/97 NA	FG-COLDCLEANERS-S1
EUCONVEYOR-S1	Casting cooling vibratory conveyor section that is covered and ventilated to a 28,000 dscfm baghouse.	01/01/04 NA	FG-RULE290-S1
EU-EMERGEN1-S1	Diesel fired emergency power generator for the new foundry.	01/07/07	NA
EU-EMERGEN2-S1	Natural gas fired emergency power generator for the existing foundry.	01/08/96	NA
EULine 1-S1	The GEOMET paint line systems consisting of a mixing room, a paint spray booth equipped with HVLP applicators and dry filter overspray control, and an induction cure process consisting of pre-curing and final cure steps for coating of metallic surfaces.	12/22/11	FG-COATING-S1, FG-MACT MMMM-S1
EULine 2-S1	The GEOMET paint line systems consisting of a mixing room, a paint spray booth equipped with HVLP applicators and dry filter overspray control, and an induction cure process consisting of pre-curing and final cure steps for coating of metallic surfaces.	03/25/14	FG-COATING-S1, FG-MACT MMMM-S1
EULine 3-S1	The GEOMET paint line systems consisting of a mixing room, a paint spray booth equipped with HVLP applicators and dry filter overspray control, and an induction cure process consisting of pre-curing and final cure steps for coating of metallic surfaces.	To Be Determined	FG-COATING-S1, FG-MACT MMMM-S1

EUMPCC-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Metal melting, pouring, and casting cooling process equipment with two electric induction furnaces with a combined daily average melting capacity of 8 tons per hour. Emissions from these processes are controlled by a 49,000 dscfm baghouse.

Flexible Group ID: FGFOUNDRY-S1, FGCAM_UNITS-S1

POLLUTION CONTROL EQUIPMENT

Baghouse

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Carbon Monoxide	57.5 pph[2]	Test Protocol	EUMPCC-S1	SC V.2	**R 336.1205(3)**
2. Particulate Matter (or Total Metal HAPs)	0.005 gr/dscf exhaust gases or 2.1 pph[2] Or 0.0004 gr/dscf exhaust gases	Test Protocol	EUMPCC-S1	SC V.2, V.4	**R 336.1331** **40 CFR 63.7690(a)(1)(i)**
3. Volatile Organic Compounds	10.0 pph[2]	Test Protocol	EUMPCC-S1	SC V.2	**R 336.1702**
4. Opacity	10 percent[2]	Six-minute average	Stack listed in VIII	SC V.3	**R 336.1301(1)(c)**
5. Visible Emissions	20% opacity (except for one 6-minute average per hour of not more than 27% opacity)	Test Protocol	Any building or structure housing EUMPCC-S1	SC V.1	**40 CFR 63.7690(a)(7)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall submit to the AQD District Supervisor, for review and approval, an operation and maintenance (O&M) plan for each capture and control system and control device for an emission unit subject to an emission limit as described in 40 CFR 63.7710. The plan shall include, but is not limited to, the following:
   a. Monthly inspections of the equipment that is important to the performance of the total capture system. **(40 CFR 63.7710(b)(1))**
   b. Operating limits for each capture system for an emission unit subject to a limit for VOHAP or TEA. **(40 CFR 63.7710(b)(2))**
   c. Preventative maintenance plan for each control device, including a schedule. **(40 CFR 63.7710(b)(3))**
   d. A site-specific monitoring plan for each bag leak detection system. **(40 CFR 63.7710(b)(4))**
   e. Corrective action plan for each baghouse. **(40 CFR 63.7710(b)(5))**
   f. Procedures for igniting gases from mold vents. **(40 CFR 63.7710(b)(6))**

   The permittee shall maintain and implement the approved O&M plans at all times. **(40 CFR 63.7710, 40 CFR 63.7745))**

2. For each capture system, wet scrubber, acid wet scrubber, or combustion device, the permittee shall establish site-specific operating limits in the O&M plans according to the procedures specified in 40 CFR 63.7733. **(40 CFR 63.7733)**

3. The permittee shall comply with the emission limits, work practice standards, and operation and maintenance requirements at all times, except during periods of startup, shutdown, or malfunction. **(40 CFR 63.7720(a))**

4. The permittee shall develop and implement a written startup, shutdown and malfunction plan (SSMP) in accordance with 40 CFR 63.6(e)(3). This plan must address the startup, shutdown and corrective actions in the event of a malfunction of the emission capture system or the add-on control device. The permittee shall operate in accordance with the SSMP when applicable. **(40 CFR 63.7720(c), 40 CFR 63.6(e)(3))**

5. For each segregated scrap storage area, bin or pile, the permittee shall prepare and operate at all times according to a written certification that the facility purchases and uses only charge material that does not include post-consumer automotive body scrap, post-consumer engine blocks, post-consumer oil filters, oily turnings, lead components, mercury switches, plastics or free organic liquids as specified in 40 CFR 63.7700(b) –OR– the permittee shall prepare and operate according to an approved written plan for the selection and inspection of iron and steel scrap as specified in 40 CFR 63.7700(c).[2] **(40 CFR 63.7700(a), 40 CFR 63.7700(b), 40 CFR 63.7700(c)**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall conduct a performance test to demonstrate compliance with the opacity limit in 40 CFR 63.7690(a)(7), following the test methods and procedures in 40 CFR 63.7732(d). Subsequent compliance testing shall be conducted no less frequently than every six months. **(40 CFR 63.7731(b))**

2. Within 180 days of permit issuance, verification of CO, PM and VOC emission rates from EUMPCC-S1, by testing at owner's expense, in accordance with Department's requirements, will be required. No less than 30 days prior to testing, a complete test plan shall be submitted to the AQD. The final plan must be approved by the AQD prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test.[2] **(R 336.1205, R 336.1702, R 336.2001, R 336.2003, R 336.2004, R 336.1213(3))**

3. On a weekly basis, the permittee shall perform and record the results of six-minute observations of visible emissions from SVMPCC-S1 during daylight hours under routine maximum operating conditions. If visible

emissions are observed, the permittee shall initiate appropriate corrective actions listed in the approved operation and maintenance (O & M) plan. **(R 336.1213(3))**

4. The permittee shall conduct subsequent compliance testing to demonstrate compliance with all applicable emission limits, no less frequently than every five years. This requirement does not apply if a Continuous Emission Monitoring System (CEMS) is used to demonstrate continuous compliance. **(40 CFR 63.7731(a))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall monitor the relative change in PM loading using a bag leak detection system for any baghouse used to meet PM or Total Metal HAP emission limits. **(40 CFR 63.7740(b))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. The permittee shall report each instance in which each emission limitation, each work practice standard, and each operation and maintenance requirement was not met, in accordance with the requirements of 40 CFR 63.7751. **(40 CFR 63.7746, 40 CFR 63.7751)**

5. The permittee shall submit applicable notifications specified in 40 CFR 63.6(h)(4) and (5), 40 CFR 63.7(b) and (c), 63.8(e), 63.8(f)(4) through (6), and 63.9(d) through (h) for a notification of intent to conduct a performance test, and a notification of compliance status as specified in 40 CFR 63.7750. **(40 CFR 63.7750)**

6. The permittee shall submit all semiannual compliance reports and semiannual reports of monitoring and deviations from any emissions limitation or operation and maintenance requirement as required by 40 CFR 63.7751(a), (b), and (d). **(40 CFR 63.7751 (a), (b), and (d))**

7. If a startup, shutdown, or malfunction occurs during the semiannual reporting period, that is not consistent with the SSMP, the permittee shall submit an immediate SSM report according to the requirements of 40 CFR 63.10(d)(5)(ii). **(40 CFR 63.10(d)(5)(ii), 40 CFR 63.7751(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SVMPCC-S1	52[2]	90[2]	**40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR, Part 63, Subparts A and EEEEE for Iron and Steel Foundries by the compliance date specified in 40 CFR 63.7683. **(40 CFR Part 63, Subparts A and EEEEE)**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EUSANDSYSTEM-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Mold making, shakeout, and sand processing equipment. Emissions from these processes are controlled by a 66,000 dscfm baghouse.

Flexible Group ID: FGFOUNDRY-S1-S1, FGCAM_UNITS-S1

POLLUTION CONTROL EQUIPMENT

Baghouse

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Carbon Monoxide	7.5 pph[2]	Test Protocol	EUSANDSYSTEM-S1	SC V.1	**R 336.1205(3)**
2. Particulate Matter	0.005 gr/dscf exhaust gases or 2.8 pph[2]	Test Protocol	EUSANDSYSTEM-S1	SC V.1	**R 336.1331**
3. Volatile Organic Compounds	6.0 pph[2]	Test Protocol	EUSANDSYSTEM-S1	SC V.1	**R 336.1702**
4. Opacity	5 percent[2]	6-minute average	Stack listed in VIII	SC VI.1	**R 336.1301(1)(c)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. Within 180 days of permit issuance, verification of CO, PM and VOC emission rates from EUSANDSYSTEM-S1, by testing at owner's expense, in accordance with Department's requirements, will be required. No less than 30 days prior to testing, a complete test plan shall be submitted to the AQD. The final plan must be approved by the AQD prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test.[2] **(R 336.1205, R 336.1702, R 336.2001, R 336.2003, R 336.2004, R 336.1213(3).**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. On a daily basis, the permittee shall perform and record the results of 6-minute observation of visible emissions from SVSS-S1 during daylight hours under routine maximum operating conditions. If visible emissions are observed, the permittee shall initiate appropriate corrective actions listed in the approved operation and maintenance (O & M) plan. **(R 336.1213(3), 40 CFR 64.6(c)(1)(i and ii)))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SVSS-S1	62[2]	110[2]	**40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EUSHOTBLAST-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

A shotblast machine with a mechanical pre-cleaner followed by a 7,500 scfm baghouse that vents outside after August 14, 2006.

Flexible Group ID: NA

POLLUTION CONTROL EQUIPMENT

Baghouse

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Particulate	0.01 pounds per 1,000 pounds of exhaust gases[2]	Test Protocol	EUSHOTBLAST-S1	SC VI.1	**R 336.1331 Table 31 J**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall perform daily non-certified visible emissions check when EUSHOTBLAST-S1 is operating. If visible emissions are observed, the permittee shall perform preventative maintenance. The results shall be recorded in the baghouse maintenance log.[2] **(R 336.1213(3)(a)(ii))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

1. The exhaust gases from the EUSHOTBLAST-S1 stack shall be discharged unobstructed vertically upwards to the ambient air. **(R 336.1213(3))**

IX. OTHER REQUIREMENT(S)

1. The permittee shall perform and record preventative maintenance activities in accordance with the approved preventative maintenance plan. **(R 336.1213(3))**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-MP-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Consists of two electric induction melting furnaces with an 11 ton holding capacity each, and a monorail pouring station with three ladles. Emissions from melting and pouring processes are controlled by associated hoods, enclosures, ductwork, and a 37,500 acfm baghouse.

Flexible Group ID: FG-NEWFOUNDRY-S1

POLLUTION CONTROL EQUIPMENT

37,500 acfm baghouse

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. PM ---OR--- Total Metal HAP	0.001 gr/dscf ---OR--- 0.00008 gr/dscf[2]	Test Protocol	EU-MP-S1	SC V.1, VI.1	**40 CFR 63.7690(a)(4)(i) or (ii) and (a)(6)(i) or (ii)**
2. PM-10	0.30 pph[2]	Test Protocol	EU-MP-S1	SC V.2, V.3	**40 CFR 52.21 (j)**
3. VOC	5.28 pph[2]	Test Protocol	EU-MP-S1	SC V.2, V.3	**40 CFR 52.21 (j)**
4. CO	44.55 pph[2]	Test Protocol	EU-MP-S1	SC V.2, V.3	**40 CFR 52.21 (j)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall implement procedures for igniting gases from mold vents in pouring areas and pouring stations that use a sand mold system as specified in the approved operation and maintenance (O&M) plan. These procedures may be waived if the permittee determines that the mold vent gases are not ignitable, ignite automatically, or cannot be ignited due to accessibility or safety issues. The permittee shall document and maintain records of this determination at the facility and make them available to the Department upon request.[2] **(40 CFR 63.7710(b)(6))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-MP-S1 unless the associated capture system and baghouse control system are installed and operating in accordance with the approved operation and maintenance (O&M) plan.[2] **(R 336.1224, R 336.1225, R 336.1910, 40 CFR 52.21(j), 40 CFR Part 63.6 (e)(1)(i), 40 CFR 63.7710)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall conduct subsequent compliance testing to demonstrate compliance with the applicable PM or Total Metal HAP emission limits, no less frequently than every 5 years. This requirement does not apply if a CEMS is used to demonstrate continuous compliance. No less than 30 days prior to testing, the permittee shall submit a complete test plan to the AQD. The AQD must approve the final plan prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test.[2] **(40 CFR 63.7731(a))**

2. Within 180 days of permit issuance, the permittee shall verify PM-10, VOC, and CO emission rates from EU-MP-S1 by testing at owner's expense, in accordance with Department requirements. No less than 30 days prior to testing, the permittee shall submit a complete test plan to the AQD. The AQD must approve the final plan prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test.[2] **(R 336.1205(1)(a) and (b), R 336.2001, R 336.2003, R 336.2004, 40 CFR 52.21(j)**)

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall monitor the relative change in PM loading using a bag leak detection system for the EU-MP-S1 baghouse.[2] **(40 CFR 63.7740(b))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. The permittee shall report each instance in which each emission limitation, each work practice standard, and each operation and maintenance requirement was not met, in accordance with the requirements of 40 CFR 63.7751. **(40 CFR 63.7746, 40 CFR 63.7751)**

5. The permittee shall submit applicable notifications specified in 40 CFR 63.6(h)(4) and (5), 40 CFR 63.7(b) and (c), 63.8(e), 63.8(f)(4) through (6), and 63.9(d) through (h) for a notification of intent to conduct a performance test, and a notification of compliance status as specified in 40 CFR 63.7750. **(40 CFR 63.7750)**

6. The permittee shall submit all semiannual compliance reports and semiannual reports of monitoring and deviations from any emissions limitation or operation and maintenance requirement as required by 40 CFR 63.7751(a), (b), and (d). **(40 CFR 63.7751 (a), (b), and (d))**

7. If a startup, shutdown, or malfunction occurs during the semiannual reporting period, that is not consistent with the SSMP, the permittee shall submit an immediate SSM report according to the requirements of 40 CFR 63.10(d)(5)(ii). **(40 CFR 63.10(d)(5)(ii), 40 CFR 63.7751(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-MP	42[2]	118[2]	**40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR, Part 63, Subpart A and Subpart EEEEE for Iron and Steel Foundries by the compliance date. **(40 CFR Part 63, Subparts A and EEEEE)**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-MCS-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Consists of the automated mold cooling conveyors and automated sand shakeout lines, including a flat deck shakeout system. Emissions from these processes are controlled by associated hoods, enclosures, ductwork, a baghouse, and a regenerative thermal oxidizer. The exhaust gas flow from this unit is approximately 61,200 acfm.

Flexible Group ID: FG-NEWFOUNDRY-S1, FGCAM_UNITS-S1

POLLUTION CONTROL EQUIPMENT

Emissions from these processes are controlled by associated hoods, enclosures, ductwork, a baghouse, and a regenerative thermal oxidizer. The exhaust gas flow from this unit is approximately 61,200 acfm.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Volatile Organic HAP (VOHAP)	A flow-weighted average of 20 ppmv[2]	Test Protocol	EU-MCS-S1	SC IV.2, V.1, VI.1 - VI.3	**40 CFR 63.7690(a)(10)**
2. PM10	2.47 pph[2]	Test Protocol	EU-MCS-S1	SC V.2	**40 CFR 52.21(j)**
3. VOC	15.49 pph[2]	Test Protocol	EU-MCS-S1	SC V.2	**40 CFR 52.21(j)**
4. CO	62.70 pph[2]	Test Protocol	EU-MCS-S1	SC V.2	**40 CFR 52.21(j)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-MCS-S1 unless the associated capture system, regenerative thermal oxidizer (RTO) and baghouse control system are installed, operated and maintained in accordance with the approved operation and maintenance (O&M) plan.[2] **(R 336.1224, R 336.1225, R 336.1910, 40 CFR 52.21(j), 40 CFR 63.6(e)(1)(i), 40 CFR 63.7690(b), 40 CFR 63.7710)**

2. If the permittee installs a CEMS in order to monitor compliance with the VOHAP limit in 40 CFR 63.7690(a), the CEMS and appropriate flow meters shall be installed at a location(s) such that the monitor(s) will provide the VOHAP concentration of the automated pallet (mold) cooling line and automated shakeout lines (as defined in 40 CFR 63.7765) separate from any dilution caused by air flow captured from equipment that is not associated with the automated pallet (mold) cooling line and automated shakeout lines.[2] **(40 CFR 63.7741(g), 40 CFR 63.7690(a)(10), 40 CFR 63.7732(f))**

3. The permittee shall install, calibrate, maintain and operate in a satisfactory manner a temperature monitoring device in the combustion chamber of the RTO to monitor and record the temperature on a continuous basis, during operation of EU-MCS-S1. The proper operation of the RTO is maintaining the combustion temperature at or above the minimum combustion temperature established during the most recent performance test that demonstrates compliance with the VOHAP emission standard in SC I.1. The permittee shall revise the approved O & M plan to include the minimum RTO combustion temperature based on the most recent performance test that demonstrates compliance with the VOHAP emission standard in SC I.1.[2] **(R 336.1205, R 336.1225, R 336.1299, R 336.1702)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee must conduct subsequent performance tests to demonstrate compliance with the applicable VOHAP emissions limitations in § 63.7690(a)(10) for EU-MCS-S1 no less frequently than every 5 years and each time you elect to change an operating limit or to comply with a different alternative emissions limit, if applicable. The requirement to conduct performance tests every 5 years does not apply to an emissions source for which a continuous emissions monitoring system (CEMS) is used to demonstrate continuous compliance. **(40 CFR 63.7731(a))**

2. Within 180 days of permit issuance, the permittee shall verify PM-10, VOC and CO emission rates from EU-MCS-S1 by testing at owner's expense, in accordance with Department requirements. The permittee shall conduct subsequent compliance testing to demonstrate compliance with all applicable emission limits (PM10, VOC, CO) no less frequently than every 5 years. This requirement does not apply if a CEMS is used to demonstrate continuous compliance.[2] **(40 CFR 63.7731(a), R 336.1213(3))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall install, operate, and maintain a CEMS in accordance with Appendix 3-S1.[2]

2. The permittee shall monitor at all times the 3-hour average VOHAP concentration using a CEMS according to the requirements of 40 CFR 63.7741(g) when EU-MCS-S1 is operating.[2] **(40 CFR 63.7740(g))**

3. The permittee may request an alternative monitoring method to demonstrate compliance with the VOHAP emission limit according to the procedures in 40 CFR 63.7747.[2] **(40 CFR 63.7747)**

4. The permittee shall monitor and keep records, in a satisfactory manner, of the MCS capture system baghouse fan amperage for the capture system for EU-MCS-S1 as defined in Section 4.2 of the facility MACT Operations and Maintenance Plan. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1205, R 336.1225, R 336.1702(a))**

5. The permittee shall install, calibrate, maintain and operate in a satisfactory manner a gauge to monitor and record the pressure drop across the EU-MCS-S1 baghouse on a continuous basis when the EU-MCS-S1 is operating.[2] **(R 336.1205, R 336.1224, R 336.1225, R 336.1301, R 336.1331, R 336.1901, R 336.1910, 40 CFR 52.21(j))**

See Appendix 3-S1

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. The permittee shall report each instance in which each emission limitation, each work practice standard, and each operation and maintenance requirement was not met, in accordance with the requirements of 40 CFR 63.7751. **(40 CFR 63.7746, 40 CFR 63.7751)**

5. The permittee shall submit applicable notifications specified in 40 CFR 63.6(h)(4) and (5), 40 CFR 63.7(b) and (c), 63.8(e), 63.8(f)(4) through (6), and 63.9(d) through (h) for a notification of intent to conduct a performance test, and a notification of compliance status as specified in 40 CFR 63.7750. **(40 CFR 63.7750)**

6. The permittee shall submit all semiannual compliance reports and semiannual reports of monitoring and deviations from any emissions limitation or operation and maintenance requirement as required by 40 CFR 63.7751(a), (b), and (d). **(40 CFR 63.7751 (a), (b), and (d))**

7. If a startup, shutdown, or malfunction occurs during the semiannual reporting period, that is not consistent with the SSMP, the permittee shall submit an immediate SSM report according to the requirements of 40 CFR 63.10(d)(5)(ii). **(40 CFR 63.10(d)(5)(ii), 40 CFR 63.7751(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-MCS	60[2]	118[2]	**40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR, Part 63, Subpart A and Subpart EEEEE for Iron and Steel Foundries by the compliance date. **(40 CFR Part 63, Subparts A and EEEEE)**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-SS-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Consists of the molding machine and related sand handling equipment. Emissions from the mold making process are controlled by associated hoods, enclosures, ductwork, and a 56,900 acfm baghouse.

Flexible Group ID: FG-NEWFOUNDRY-S1, FGCAM_UNITS-S1

POLLUTION CONTROL EQUIPMENT

56,900 acfm baghouse

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. PM-10	2.30 pph[2]	Test Protocol	EU-SS-S1	SC V.1, V.2	**40 CFR 52.21 (j)**
2. VOC	4.00 pph[2]	Test Protocol	EU-SS-S1	SC V.1, V.2	**40 CFR 52.21 (j)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-SS-S1 unless the associated capture system and baghouse control system are installed, operated and maintained in accordance with the approved operation and maintenance (O&M) plan.[2] **(R 336.1224, R 336.1225, R 336.1910, 40 CFR 52.21(j))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. Within 180 days of permit issuance, the permittee shall verify PM-10, and VOC emission rates from EU-SS-S1 by testing at owner's expense, in accordance with Department requirements. No less than 30 days prior to testing, the permittee shall submit a complete test plan to the AQD. The AQD must approve the final plan prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test.[2] **(R 336.1205(1)(a) and (b), R 336.2001, R 336.2003, R 336.2004, 40 CFR 52.21(j))**

2. The permittee shall conduct subsequent compliance testing to demonstrate compliance with all applicable emission limits, no less frequently than every 5 years. This requirement does not apply if a CEMS is used to demonstrate continuous compliance.[2] **(R 336.2001, R 336.2003, R 336.2004, R 336.1213(3))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall install, calibrate, maintain and operate in a satisfactory manner a gauge to monitor and record the pressure drop across the EU-SS-S1 baghouse on a continuous basis when the baghouse is operating.[2] **(R 336.1205, R 336.1224, R 336.1225, R 336.1301, R 336.1331, R 336.1901, R 336.1910, 40 CFR 52.21(j))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-SS(NEW)	52[2]	118[2]	**40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-CCFBACK-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Consists of the back section of casting cooling conveyors and a shot blast machine. Emissions from this emission unit are controlled by associated hoods, enclosures, ductwork, and a 65,360 acfm baghouse.

Flexible Group ID: FG-NEWFOUNDRY-S1, FGCAM_UNITS-S1

POLLUTION CONTROL EQUIPMENT

The CCF2 baghouse – approximate flow of 65,360 acfm

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. PM-10	2.64 pph[2]	Test Protocol	EU-CCFBACK-S1	SC V.1, V.2	**40 CFR 52.21 (j)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-CCFBACK-S1 unless the associated capture system and baghouse control systems are installed and operating in accordance with the approved operation and maintenance (O&M) plan.[2] **(R 336.1224, R 336.1225, R 336.1910, 40 CFR 52.21(j))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. Within 180 days of permit issuance, the permittee shall verify PM-10 emission rate from the CCF2 Baghouse by testing at owner's expense, in accordance with Department requirements. No less than 30 days prior to testing, the permittee shall submit a complete test plan to the AQD. The AQD must approve the final plan prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test.[2] **(R 336.1205(1)(a) and (b), R 336.2001, R 336.2003, R 336.2004, 40 CFR 52.21(j))**

2. The permittee shall conduct subsequent compliance testing to demonstrate compliance with all applicable emission limits, no less frequently than every 5 years. This requirement does not apply if a CEMS is used to demonstrate continuous compliance.[2] **(R 336.2001, R 336.2003, R 336.2004, R 336.1213(3))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall install, calibrate, maintain and operate in a satisfactory manner a gauge to monitor and record the pressure drop across the CCF2 baghouse on a continuous basis when the baghouse is operating.[2] **(R 336.1205, R 336.1224, R 336.1225, R 336.1301, R 336.1331, R 336.1901, R 336.1910, 40 CFR 52.21(j))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-CCF2	54[2]	118[2]	**40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-EMERGEN1-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Diesel fired emergency power generator for the new foundry.

Flexible Group ID: NA

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. HC	1.0 g/HP-hr	Test Protocol	EU-EMERGEN1-S1	SC V.1 or VI.2	**40 CFR 60.4205**
2. NOx	6.9 g/HP-hr	Test Protocol	EU-EMERGEN1-S1	SC V.1 or VI.2	**40 CFR 60.4205**
3. CO	8.5 g/HP-hr	Test Protocol	EU-EMERGEN1-S1	SC V.1 or VI.2	**40 CFR 60.4205**
4. PM	0.40 g/HP-hr	Test Protocol	EU-EMERGEN1-S1	SC V.1 or VI.2	**40 CFR 60.4205**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Diesel Fuel	Sulfur content shall not exceed 15 ppm	Instantaneous	EU-EMERGEN1-S1	SC VI.3	**40 CFR 60.4207(b), 40 CFR 80.510(b)**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall operate EU-EMERGEN1-S1 in compliance with the emission limitations and operating limitations in this subpart. EU-EMERGEN1-S1 must be operated and maintained at any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. **(40 CFR 63.6605, 40 CFR 60.4206)**

2. The permittee shall maintain and operate EU-EMERGEN1-S1 per the manufacturer's emission related written instructions or develop a maintenance plan which must provide for the maintenance and operation of the engine in a manner consistent with good air pollution control practices for minimizing emissions. **(40 CFR 63.6640(a), 40 CFR 60.4211(a)(1))**

3. The permittee is not limited on hours of operation of EU-EMERGEN1-S1 during emergency situations. **(40 CFR 63.6640(f)(1)(i))**

4. The permittee shall not exceed 100 hours per year for maintenance checks and readiness testing. The permittee may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency RICE beyond 100 hours per year. **(40 CFR 63.6640(f)(1)(ii))**

5. The permittee may operate EU-EMERGEN1-S1 up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing, as allowed in 40 CFR 63.6640(f)(1)(iii). **(40 CFR 63.6640(f)(1)(iii))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-EMERGEN1-S1 unless a non-resettable hour meter to track the number of operational hours is installed and operating properly. **(R 336.1213(3), 40 CFR 60.4211(a))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. Within 180 days after issuance of this permit, the permittee shall verify HC, NOx, CO, and PM emission rates from EU-EMERGEN1-S1, by testing at owner's expense, in accordance with Department requirements or by providing manufacturer's certification documentation as required in SC VI.2. If testing is to be performed, the permittee must submit a complete stack-testing plan to the AQD. No less than 60 days prior to testing, the permittee must submit a complete stack-testing plan to the AQD. The AQD must approve the final plan prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test. **(R 336.2001, R 336.2003, R 336.2004, 40 CFR 60.4211)**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall keep in a satisfactory manner, records of hours of operation recorded through the non-resettable hour meter. The permittee shall document how many hours were spent during emergency operation, non-emergency operation and demand response operation. The permittee shall keep all records on file and make them available to the department upon request. **(R 336.1213(3), 40 CFR 60.4214(b))**

2. The permittee shall keep, in a satisfactory manner, a record of testing required in SC V.1 or manufacturer's certification documentation indicating that EU-EMERGEN1-S1 meets the applicable emission limitations contained in the federal Standards of Performance for New Stationary Sources 40 CFR Part 60 Subpart IIII. The permittee shall keep all records on file and make them available to the Department upon request. **(40 CFR 60.4211)**

3. The permittee shall keep, in a satisfactory manner, fuel supplier certification records or fuel sample test data, for each delivery of diesel fuel oil used in EU-EMERGEN1-S1, demonstrating that the fuel sulfur content meets the requirement of 40 CFR 80.510(b). The certification or test data shall include the name of the oil supplier or laboratory, and the sulfur content of the fuel oil. **(40 CFR 60.4207(a), 40 CFR 80.510(b))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SVEMERGEN1	NA	NA	NA

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the federal Standards of Performance for New Stationary Sources as set forth in 40 CFR Part 60 Subpart A and Subpart IIII. **(40 CFR Part 60 Subpart A and Subpart IIII)**

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-EMERGEN2-S1
EMISSION UNIT CONDITIONS

DESCRIPTION

Natural gas fired emergency power generator for the existing foundry.

Flexible Group ID: NA

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The EU-EMERGEN2-S1 shall be installed, maintained, and operated in a satisfactory manner. A list of recommended work practice standards as specified in 40 CFR 63.6602 and Table 2c, Item 1 or the permittee may petition the Administrator pursuant to the requirements of 40 CFR 63.6(g) for alternative work practices. The following are the recommended work practices specified in 40 CFR Part 63, Subpart ZZZZ, Table 2c:
   a. Change oil and filter every 500 hours of operation or annually, whichever comes first, except as allowed in Condition III.3; and
   b. Inspect the spark plugs every 1,000 hours of operation or annually, whichever comes first; and
   c. Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.

   If EU-EMERGEN2-S1 is being operated during an emergency and it is not possible to shut down the engine to perform the work practice standards on the schedule required the work practice standard can be delayed until the emergency is over. The work practice should be performed as soon as practicable after the emergency has ended or the unacceptable risk under Federal, State or local law has been abated. Sources must report any failure to perform the work practice on the schedule required and the Federal, State or local law or which the risk was deemed unacceptable. **(40 CFR 63.6602, 40 CFR Part 63, Subpart ZZZZ, Table 2c, Item 1)**

2. The permittee shall operate EU-EMERGEN2-S1 in compliance with the emission limitations and operating limitations in this subpart. EU-EMERGEN2-S1 must be operated and maintained at any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. **(40 CFR 63.6605)**

3. The permittee may utilize an oil analysis program in order to extend the specified oil change requirement. The oil analysis must be performed at the same frequency as oil changes are required. The oil analysis program must analyze the parameters and keep records as required in 40 CFR 63.6625(j). **(40 CFR 63.6625(j))**

4. The permittee shall maintain and operate EU-EMERGEN2-S1 per the manufacturer's emission related written instructions or develop a maintenance plan which must provide for the maintenance and operation of the engine in a manner consistent with good air pollution control practices for minimizing emissions. **(40 CFR 63.6625(e), 40 CFR 63.6640(a), 40 CFR Part 63, Subpart ZZZZ, Table 6, Item 9)**

5. The permittee shall minimize the time spent at idle during startup and minimize the startup time of EU-EMERGEN2-S1 to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which time the emission standards applicable to all times other than startup apply. **(40 CFR 63.6625(h))**

6. The permittee is not limited on hours of operation of EU-EMERGEN2-S1 during emergency situations. **(40 CFR 63.6640(f)(i))**

7. The permittee shall not exceed 100 hours per year for maintenance checks and readiness testing. The permittee may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency RICE beyond 100 hours per year. **(40 CFR 63.6640(f)(ii))**

8. The permittee may operate EU-EMERGEN2-S1 up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing, as allowed in 40 CFR 63.6640(f)(iii). **(40 CFR 63.6640(f)(iii))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-EMERGEN2-S1 unless a non-resettable hour meter to track the number of operational hours is installed and operating properly. **(40 CFR 63.6625(f))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee has the option of utilizing an oil analysis program in order to extend the specified oil change requirement in Table 2c of this subpart. If this option is utilized, the oil analysis must be performed at the same frequency specified for changing the oil listed in Table 2c. The analysis program must at a minimum analyze the following three parameters: Total Acid Number, viscosity, and percent water content. The condemning limits for these parameters are as follows: Total Acid Number increases by more than 3.0 milligrams of potassium hydroxide (KOH) per gram from Total Acid Number of the oil when new; viscosity of the oil has changed by more than 20 percent from the viscosity of the oil when new; or percent water content (by volume) is greater than 0.5. If all of these condemning limits are not exceeded, the permittee is not required to change the oil. If any of the limits are exceeded, the permittee must change the oil within 2 days of receiving the results of the analysis; if the engine is not in operation when the results of the analysis are received, the permittee must change the oil within 2 days or before commencing operation, whichever is later. The permittee must keep records of the parameters that are analyzed as part of the program, the results of the analysis, and the oil changes for the engine. The analysis program must be part of the maintenance plan for the engine. **(40 CFR 63.6625(j))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall keep in a satisfactory manner, records of the occurrence and duration of each malfunction of operation or the air pollution control monitoring equipment. The permittee shall keep all records on file and make them available to the department upon request. **(40 CFR 63.6655(a)(2), 40 CFR 63.6660)**

2. The permittee shall keep in a satisfactory manner, records of actions taken during periods of malfunction to minimize emissions, including corrective actions to restore malfunctioning process and air pollution control and monitoring equipment to its normal or usual manner of operation. The permittee shall keep all records on file and make them available to the department upon request. **(40 CFR 63.6655(a)(5), 40 CFR 63.6660)**

3. The permittee shall keep in a satisfactory manner, records to demonstrate continuous compliance with operating limitations in SC III.1. The permittee shall keep all records on file and make them available to the department upon request. **(40 CFR 63.6655(d), 40 CFR 63.6660)**

4. The permittee shall keep in a satisfactory manner, records of the maintenance conducted to demonstrate the engine and after-treatment control device (if any) were operated and maintained according to the developed maintenance plan. The permittee shall keep all records on file and make them available to the department upon request. **(40 CFR 63.6655(e), 40 CFR 63.6660)**

5. The permittee shall keep in a satisfactory manner, records of hours of operation recorded through the non-resettable hour meter. The permittee shall document how many hours were spent during emergency operation and how many hours were spent during non-emergency operation. If the engines were used for demand response operation, the permittee shall keep records of the notification of the emergency situation and the time the engine was operated as part of demand response. The permittee shall keep all records on file and make them available to the department upon request. **(40 CFR 63.6655(f), 40 CFR 63.6660)**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SVEMERGEN2	NA	NA	NA

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable requirements of the federal National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines as set forth in 40 CFR Part 63, Subparts A and ZZZZ. **(40 CFR Part 63, Subparts A and ZZZZ)**

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

D. FLEXIBLE GROUP CONDITIONS

Part D outlines the terms and conditions that apply to more than one emission unit. The permittee is subject to the special conditions for each flexible group in addition to the General Conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply, NA (not applicable) has been used in the table. If there are no special conditions that apply to more than one emission unit, this section will be left blank.

FLEXIBLE GROUP SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FGFOUNDRY-S1-S1	Flexible group that includes two emissions units.	EUMPCC-S1 EUSANDSYSTEM-S1
FG-COLDCLEANERS-S1	Any cold cleaner that is grandfathered or exempt from Rule 201, pursuant to Rule 281(h) or Rule 285(r)(iv). Existing cold cleaners were placed into operation prior to July 1, 1979. New cold cleaners were placed into operation on or after July 1, 1979.	EUCOLDCLEANER-S1
FG-RULE290-S1	Any emission unit that emits air contaminants and is exempt from the requirements of Rule 201, pursuant to Rules 278 and 290.	EUCONVEYOR-S1
FGCAM_UNITS-S1	The equipment in this flexible group is subject to Compliance Assurance Monitoring, 40 CFR 64.6.	EUMPCC-S1 EUSANDSYSTEM-S1 EU-MCS-S1 EU-SS-S1 EU-CCFBACK-S1
FG-NEWFOUNDRY-S1	All emission units of the new expansion foundry.	EU-MP-S1 EU-MCS-S1 EU-SS-S1 EU-CCFBACK-S1
FG-COATING-S1	Three GEOMET paint line systems each consisting of a mixing room, a paint spray booth equipped with HVLP applications and dry filter overspray control, and an induction cure process consisting of pre-curing and final cure steps for coating of metallic surfaces.	EULine1-S1 EULine2-S1 EULine3-S1
FG-SOURCE-S1	All metallic surface coating lines and all associated purge and cleanup operations at the stationary source. This includes any metallic surface coating line covered by this or any other general permit or any permit to install issued pursuant to Rule 201, and any metallic surface coating line exempt from the requirement to obtain a PTI pursuant to Rule 287 and/or Rule 290.	NA

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FG-MACT MMMM-S1	Each new, reconstructed, and existing affected source described in 40 CFR 63.3881(a)(1), including the subcategories listed in 40 CFR, Part 63, Subpart MMMM, 40 CFR 63.3881(a)(2) through (6), meeting the applicability requirements of 40 CFR 63.3881(b), which is engaged in the surface coating of miscellaneous metal parts and products. The affected source includes the collection of all the items listed in 40 CFR 63.3882(b)(1) through (4). Surface coating is defined by 40 CFR 63.3881, as the application of coating to a substrate using, for example, spray guns or dip tanks. Surface coating also includes associated activities, such as surface preparation, cleaning, mixing, and storage if they are directly related to the application of the coating. The 40 CFR, Part 63, Subpart MMMM, does not apply to surface coating or a coating operation that meets any of the criteria of 40 CFR 63.3881(c)(1) through (17).	EULine1-S1 EULine2-S1 EULine3-S1

FGFOUNDRY-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Flexible group that includes two emission units.

Emission Units: EUMPCC-S1, EUSANDSYSTEM-S1

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Particulate Matter	19.4 tons per year[2]	12-month rolling time period	EUMPCC-S1, EUSANDSYSTEM-S1	SC VI.2	**R 336.1205(3)**
2. Carbon Monoxide	156.0 tons per year[2]	12-month rolling time period	EUMPCC-S1, EUSANDSYSTEM-S1	SC VI.2	**R 336.1205(3)**
3. Volatile Organic Compounds	38.4 tons per year[2]	12-month rolling time period	EUMPCC-S1, EUSANDSYSTEM-S1	SC VI.2	**R 336.1205(3), R 336.1702(a)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Metal	Metal melt rate shall not exceed 48,000 tons per year.[2]	Based on a 12-month rolling time period as determined at the end of each calendar month.	EUMPCC-S1, EUSANDSYSTEM-S1	SC VI.1	**R 336.1205(1) and (3), R 336.1225, R 336.1702(a)**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall not operate FGFOUNDRY-S1 for more than 7,872 hours per 12-month rolling time period as determined at the end of each calendar month.[2] **(R 336.1205(1)(a) and (3), R 336.1225, R 336.1702(a))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall monitor in a satisfactory manner the metal melt rate and hours of operation for FGFOUNDRY-S1 on a monthly basis.[2] **(R 336.1205(1)(a) and (3), R 336.1225, R 336.1702(a))**

2. The permittee shall keep the following information on a monthly basis for FGFOUNDRY-S1:
   a. Tons of metal processed.
   b. Hours of operation.
   c. Monthly and previous 12-month PM, CO, and VOC emission rates, calculated as follows. Monthly PM emissions from each baghouse shall be calculated by multiplying the PM emission rate (in pph) measured during the most recent stack test with the monthly operation hours. The sum of PM emissions from both baghouses divided by 2000 will determine the monthly total PM emissions in tons per month. This monthly PM emission rate will be added to the preceding 11-month total PM emission rate to determine a 12-month rolling emission rate (in tpy).

      Monthly CO and VOC emission rates shall be calculated using the following emission factors:

      EUMPCC-S1:
      5.75 lb CO/ton of melt
      1.00 lb VOC/ton of melt

      EUSANDSYSTEM-S1:
      0.75 lb CO/ton of melt
      0.60 lb VOC/ton of melt

      Monthly melt rates shall be multiplied with the appropriate factors from above to determine the monthly CO and VOC mass emissions from each baghouse. The sum of CO and the sum of VOC emissions from both baghouses divided by 2000 will determine the monthly total CO and VOC emissions in tons per month, respectively. These monthly emission rates will be added to the previous 11-month total emission rates of each CO and VOC to determine 12-month rolling emission rates in tons per year for CO and VOC. [Note: Alternate CO and VOC emission factors may be used upon prior approval from the District Supervisor].[2] **(R 336.1205(1) and (3), R 336.1225, R 336.1702(a))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
NA	NA	NA	NA

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-COLDCLEANERS-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Any cold cleaner that is grandfathered or exempt from Rule 201 pursuant to Rule 278 and Rule 281(h), or Rule 285(r)(iv). Existing cold cleaners were placed into operation prior to July 1, 1979. New cold cleaners were placed into operation on or after July 1, 1979.

Emission Unit: EUCOLDCLEANER-S1

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

NA

II. MATERIAL LIMIT(S)

1. The permittee shall not use cleaning solvents containing more than five percent by weight of the following halogenated compounds: methylene chloride, perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, chloroform, or any combination thereof. **(R 336.1213(2))**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. Cleaned parts shall be drained for no less than 15 seconds or until dripping ceases. **(R 336.1611(2)(b), R 336.1707(3)(b))**

2. The permittee shall perform routine maintenance on each cold cleaner as recommended by the manufacturer. **(R 336.1213(3))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The cold cleaner must meet one of the following design requirements:
   a. The air/vapor interface of the cold cleaner is no more than ten square feet. **(R 336.1281(h))**
   b. The cold cleaner is used for cleaning metal parts and the emissions are released to the general in-plant environment. **(R 336.1285(r)(iv))**

2. The cold cleaner shall be equipped with a device for draining cleaned parts. **(R 336.1611(2)(b), R 336.1707(3)(b))**

3. All new and existing cold cleaners shall be equipped with a cover and the cover shall be closed whenever parts are not being handled in the cold cleaner. **(R 336.1611(2)(a), R 336.1707(3)(a))**

4. The cover of a new cold cleaner shall be mechanically assisted if the Reid vapor pressure of the solvent is more than 0.3 psia or if the solvent is agitated or heated. **(R 336.1707(3)(a))**

5. If the Reid vapor pressure of any solvent used in a new cold cleaner is greater than 0.6 psia; or, if any solvent used in a new cold cleaner is heated above 120 degrees fahrenheit, then the cold cleaner must comply with at least one of the following provisions:
   a. The cold cleaner must be designed such that the ratio of the freeboard height to the width of the cleaner is equal to or greater than 0.7. **(R 336.1707(2)(a))**

b. The solvent bath must be covered with water if the solvent is insoluble and has a specific gravity of more than 1.0. **(R 336.1707(2)(b))**
c. The cold cleaner must be controlled by a carbon adsorption system, condensation system, or other method of equivalent control approved by the AQD. **(R 336.1707(2)(c))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. For each new cold cleaner in which the solvent is heated, the solvent temperature shall be monitored and recorded at least once each calendar week during routine operating conditions. **(R 336.1213(3))**

2. The permittee shall maintain the following information on file for each cold cleaner **(R 336.1213(3))**:
   a. A serial number, model number, or other unique identifier for each cold cleaner.
   b. The date the unit was installed, manufactured or that it commenced operation.
   c. The air/vapor interface area for any unit claimed to be exempt under Rule 281(h).
   d. The applicable Rule 201 exemption.
   e. The Reid vapor pressure of each solvent used.
   f. If applicable, the option chosen to comply with Rule 707(2).

3. The permittee shall maintain written operating procedures for each cold cleaner. These written procedures shall be posted in an accessible, conspicuous location near each cold cleaner. **(R 336.1611(3), R 336.1707(4))**

4. As noted in Rule 611(2)(c) and Rule 707(3)(c), if applicable, an initial demonstration that the waste solvent is a safety hazard shall be made prior to storage in non-closed containers. If the waste solvent is a safety hazard and is stored in non-closed containers, verification that the waste solvent is disposed of so that not more than 20 percent, by weight, is allowed to evaporate into the atmosphere shall be made on a monthly basis. **(R 336.1213(3), R 336.1611(2)(c), R 336.1707(3)(c))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

NA

IX. OTHER REQUIREMENT(S)

NA

FG-RULE 290-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Any emission unit that emits air contaminants and is exempt from the requirements of Rule 201, pursuant to Rules 278 and 290.

Emission Unit: EUCONVEYOR-S1

POLLUTION CONTROL EQUIPMENT

Baghouse

I. EMISSION LIMIT(S)

1. Each emission unit that emits only noncarcinogenic volatile organic compounds or noncarcinogenic materials which are listed in Rule 122(f) as not contributing appreciably to the formation of ozone if the total uncontrolled or controlled emissions of air contaminants are not more than 1,000 or 500 pounds per month, respectively. **(R 336.1290(a)(i))**

2. Each emission unit that the total uncontrolled or controlled emissions of air contaminants are not more than 1,000 or 500 pounds per month, respectively, and all the following criteria listed below are met **(R 336.1290(a)(ii))**:
   a. For noncarcinogenic air contaminants, excluding noncarcinogenic volatile organic compounds and noncarcinogenic materials which are listed in Rule 122(f) as not contributing appreciably to the formation of ozone, with initial threshold screening levels greater than or equal to 2.0 micrograms per cubic meter, the uncontrolled or controlled emissions shall not exceed 1,000 or 500 pounds per month, respectively. **(R 336.1290(a)(ii)(A))**
   b. For noncarcinogenic air contaminants, excluding noncarcinogenic volatile organic compounds and noncarcinogenic materials which are listed in Rule 122(f) as not contributing appreciably to the formation of ozone, with initial threshold screening levels greater than or equal to 0.04 microgram per cubic meter and less than 2.0 micrograms per cubic meter, the uncontrolled or controlled emissions shall not exceed 20 or 10 pounds per month, respectively. **(R 336.1290(a)(ii)(B))**
   c. For carcinogenic air contaminants with initial risk screening levels greater than or equal to 0.04 microgram per cubic meter, the uncontrolled or controlled emissions shall not exceed 20 or 10 pounds per month, respectively. **(R 336.1290(a)(ii)(C))**
   d. The emission unit shall not emit any air contaminants, excluding non-carcinogenic volatile organic compounds and noncarcinogenic materials which are listed in Rule 122(f) as not contributing appreciably to the formation of ozone, with an initial threshold screening level or initial risk screening level less than 0.04 microgram per cubic meter. **(R 336.1290(a)(ii)(D))**

3. Each emission unit that emits only noncarcinogenic particulate air contaminants and other air contaminants that are exempted under Rule 290(a)(i) and/or Rule 290(a)(ii), if all of the following provisions are met **(R 336.1290(a)(iii))**:
   a. The particulate emissions are controlled by an appropriately designed and operated fabric filter collector or an equivalent control system which is designed to control particulate matter to a concentration of less than or equal to 0.01 pound of particulate per 1,000 pounds of exhaust gases and which does not have an exhaust gas flow rate more than 30,000 actual cubic feet per minute. **(R 336.1290(a)(iii)(A))**
   b. The visible emissions from the emission unit are not more than five percent opacity in accordance with the methods contained in Rule 303. **(R 336.1290(a)(iii)(B))**
   c. The initial threshold screening level for each particulate air contaminant, excluding nuisance particulate, is more than 2.0 micrograms per cubic meter. **(R 336.1290(a)(iii)(C))**

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The provisions of Rule 290 apply to each emission unit that is operating pursuant to Rule 290. **(R 336.1290)**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall maintain records of the following information for each emission unit for each calendar month using the methods outlined in the DEQ, AQD Rule 290, Permit to Install Exemption Record form (EQP 3558) or an alternative format that is approved by the AQD District Supervisor **(R 336.1213(3))**:
   a. Records identifying each air contaminant that is emitted. **(R 336.1213(3))**
   b. Records identifying if each air contaminant is controlled or uncontrolled. **(R 336.1213(3))**
   c. Records identifying if each air contaminant is either carcinogenic or non-carcinogenic. **(R 336.1213(3))**
   d. Records identifying the ITSL and IRSL, if established, of each air contaminant that is being emitted under the provisions of Rules 290(a)(ii) and (iii). **(R 336.1213(3))**
   e. Material use and calculations identifying the quality, nature, and quantity of the air contaminant emissions in sufficient detail to demonstrate that the actual emissions of the emission unit meet the emission limits outlined in this table and Rule 290. **(R 336.1213(3), R 336.1290(c))**

2. The permittee shall maintain an inventory of each emission unit that is exempt pursuant to Rule 290. This inventory shall include the following information **(R 336.1213(3))**:
   a. The permittee shall maintain a written description of each emission unit as it is maintained and operated throughout the life of the emission unit. **(R 336.1290(b), R 336.1213(3))**
   b. For each emission unit that emits noncarcinogenic particulate air contaminants pursuant to Rule 290(a)(iii), the permittee shall maintain a written description of the control device, including the designed control efficiency and the designed exhaust gas flow rate**. (R 336.1213(3))**

3. For each emission unit that emits noncarcinogenic particulate air contaminants pursuant to Rule 290(a)(iii), the permittee shall perform a monthly visible emission observation of each stack or vent during routine operating conditions. This observation need not be performed using Method 9. The permittee shall keep a written record of the results of each observation. **(R 336.1213(3))**

See Appendix 4-S1

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

NA

IX. OTHER REQUIREMENT(S)

NA

FGCAM_UNITS-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

The equipment in this flexible group is subject to Compliance Assurance Monitoring, 40 CFR 64.6.

Emission Units: EUMPCC-S1, EUSANDSYSTEM-S1, EU-SS-S1, EU-MCS-S1, EU-CCFBACK-S1

POLLUTION CONTROL EQUIPMENT

1. EUMPCC-S1 Baghouse – approximate flow of 49,000 dscfm.
2. EUSANDSYSTEM-S1 Baghouse – approximate flow of 66,000 dscfm.
3. EU-SS-S1 Baghouse – approximate flow of 56,900 acfm.
4. EU-MCS-S1 Baghouse – approximate flow of 61,200 acfm.
5. EU-CCFBACK-S1 (CCF2) Baghouse – approximate flow of 65,360 acfm.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. If visible emissions are observed, the permittee shall initiate corrective action, beginning with an evaluation of the occurrence to determine the action necessary to correct the situation. **(40 CFR 64.7(d), 40 CFR 64.6(c))**

2. The permittee shall operate the baghouse's differential pressure in accordance with the CAM plan. If an excursion occurs outside of this range, the permittee shall initiate corrective action. **(40 CFR 64.7(d), 40 CFR 64.6(c))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall measure the pressure drop and take a daily reading as an indicator of proper operation of the dust collector for EU-SS-S1, EU-CCFBACK-S1, EU-MCS-S1. **(40 CFR 64.6(c)(1)(i and ii))**

2. The permittee shall perform a daily noncertified visual opacity observation as an indicator of proper operation of the dust collector for EUSANDSYSTEM-S1. **(40 CFR 64.6(c)(1)(i and ii))**

3. The permittee shall monitor the bag leak detection system on a continuous basis as an indicator of proper operation of the dust collector for EU-MCS-S1. **(40 CFR 64.6(c)(1)(i and ii))**

   An excursion is a departure from the indicator range listed in the facility's CAM plan. **(40 CFR 64.6(c)(2))**

4. Upon detecting an excursion or exceedance, the owner or operator shall restore operation of the pollutant-specific emissions unit (including the control device and associated capture system) to its normal or usual manner of operation as expeditiously as practicable in accordance with good air pollution control practices for minimizing emissions. The response shall include minimizing the period of any startup, shutdown or malfunction and taking any necessary corrective actions to restore normal operation and prevent the likely recurrence of the cause of an excursion or exceedance (other than those caused by excused startup or shutdown conditions). **(40 CFR 64.7(d))**

5. Except for, as applicable, monitoring malfunctions, associated repairs, and required quality assurance or control activities (including, as applicable, calibration checks and required zero and span adjustments), the owner or operator shall conduct all monitoring in continuous operation (or shall collect data at all required intervals) at all times that the pollutant-specific emissions unit is operating. Data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities shall not be used for purposes of this part, including data averages and calculations or fulfilling a minimum data availability requirement, if applicable. The owner or operator shall use all the data collected during all other periods in assessing the operation of the control device and associated control system. A monitoring malfunction is any sudden, in frequent, not reasonably preventable failure of the monitoring to provide valid data. Monitoring failures that are caused in part by poor maintenance or careless operation are not malfunctions. **(40 CFR 64.6(c)(3), 64.7(c))**

6. The permittee shall properly maintain the monitoring system, including keeping necessary parts for routine repair of the monitoring equipment. **(40 CFR 64.7(b))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. Each semiannual report of monitoring and deviations shall include summary information on the number, duration and cause of excursions and/or exceedances and the corrective actions taken. If there were no excursions and/or exceedances in the reporting period, then this report shall include a statement that there were no excursions and/or exceedances. **(40 CFR 64.9(a)(2)(i))**

5. Each semiannual report of monitoring and deviations shall include summary information on monitor downtime. If there were no periods of monitor downtime in the reporting period, then this report shall include a statement that there were no periods of monitor downtime. **(40 CFR 64.9(a)(2)(ii))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
NA	NA	NA	NA

IX. OTHER REQUIREMENTS

1. The permittee shall comply with all applicable requirements of 40 CFR Part 64. **(40 CFR Part 64)**

2. If the permittee identifies a failure to achieve compliance with an emission limitation or standard for which the approved monitoring did not provide an indication of an excursion or exceedance while providing valid data, or the results of compliance or performance testing document a need to modify the existing indicator ranges or designated conditions, the permittee shall promptly notify the AQD and, if necessary, submit a proposed modification to the CAM Plan to address the necessary monitoring changes. Such a modification may include, but is not limited to, reestablishing indicator ranges or designated conditions, modifying the frequency of conducting monitoring and collecting data, or the monitoring of additional parameters. **(40 CFR 64.7(e))**

FG-NEWFOUNDRY-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

All emission units of the new expansion foundry.

Emission Units: EU-MP-S1, EU-MCS-S1, EU-SS-S1, EU-CCFBACK-S1

POLLUTION CONTROL EQUIPMENT

Baghouses

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Opacity	20% 6-min average, except for one 6-min average per hour that does not exceed 27%[2]	Test Protocol	Buildings or Structures Housing Emission Source at FG-NEWFOUNDRY-S1	SC III.1, III.2, III.3, V.I, VI.1 - VI.7	**40 CFR 63.7690(a)(7)**
2. PM-10	27.0 tpy[2]	12-Month Rolling Time Period	FG-NEWFOUNDRY-S1	SC VI.8	**40 CFR 52.21 (j)**
3. CO	375.5 tpy[2]	12-Month Rolling Time Period	FG-NEWFOUNDRY	SC VI.8	**40 CFR 52.21 (j)**
4. VOC	86.6 tpy[2]	12-Month Rolling Time Period	FG-NEWFOUNDRY-S1	SC VI.8	**40 CFR 52.21 (j)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Metal	115,500 tons per year[2]	12-month rolling time period	FG-NEWFOUNDRY-S1	SC VI.8	**40 CFR 52.21 (j)**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall maintain, in a format acceptable to the AQD District Supervisor, an operation and maintenance (O&M) plan for each capture and collection system and control device for an emission unit or flexible group subject to an emission limit as described in 40 CFR 63.7710. The plan shall include, but is not limited to, the following:
   a. Monthly inspections of the equipment that is important to the performance of the total capture system. **(40 CFR 63.7710(b)(1))**
   b. Operating limits for each capture system for an emission unit subject to a limit for VOHAP. **(40 CFR 63.7710(b)(2))**
   c. Preventative maintenance plan for each control device, including a schedule. **(40 CFR 63.7710(b)(3))**
   d. A site-specific monitoring plan for each bag leak detection system. **(40 CFR 63.7710(b)(4))**
   e. Corrective action plan for each baghouse. **(40 CFR 63.7710(b)(5))**
   f. Procedures for igniting gases from mold vents unless it is determined that the mold vent gases are not ignitable, ignite automatically, or cannot be ignited due to accessibility or safety issues. **(40 CFR 63.7710(b)(6))**

The permittee shall maintain and implement the approved O&M plan at all times.[2] **(40 CFR 63.7710, 40 CFR 63.7745)**

2. The permittee shall comply with the emission limits, work practice standards, and operation and maintenance requirements at all times, except during periods of startup, shutdown, or malfunction.[2] **(40 CFR 63.7720(a))**

3. The permittee shall develop and implement a written startup, shutdown and malfunction plan (SSMP) in accordance with 40 CFR 63.6(e)(3). This plan must address the startup, shutdown and corrective actions in the event of a malfunction of the emission capture system or the add-on control device. The permittee shall operate in accordance with the SSMP when applicable.[2] **(40 CFR 63.7720(c), 40 CFR 63.6(e)(3))**

4. For each segregated scrap storage area, bin or pile, the permittee shall prepare and operate at all times according to a written certification that the facility purchases and uses only charge material that does not include post-consumer automotive body scrap, post-consumer engine blocks, post-consumer oil filters, oily turnings, lead components, mercury switches, plastics or free organic liquids as specified in 40 CFR 63.7700 (b) –OR– the permittee shall prepare and operate according to an approved written plan for the selection and inspection of iron and steel scrap as specified in 40 CFR 63.7700(c).[2] **(40 CFR 63.7700(a), 40 CFR 63.7700(b), 40 CFR 63.7700(c))**

5. For each capture system subject to the VOHAP limit, the permittee shall establish site-specific operating limits in the O&M plans according to the procedures specified in 40 CFR 63.7733 (a).[2] **(40 CFR 63.7733 (a))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. Subsequent performance testing to demonstrate compliance with the opacity limit in 40 CFR 63.7690(a)(7) shall be conducted no less frequently than every 6 months. **(40 CFR 63.7730(a), 40 CFR 63.7731(b))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. During the period between the compliance date specified for FG-NEWFOUNDRY-S1 and the date when operating limits have been established during the performance test, the permittee shall maintain a log detailing the operation and maintenance of the process and control equipment.[2] **(40 CFR 63.7720(b))**

2. The permittee shall keep all records specified in 40 CFR 63.7752(a)(1) through (4), records for each CEMS as specified in 40 CFR 63.7752(b)(1) through (4) and records required by 40 CFR 63.7743, 40 CFR 63.7744, and 40 CFR 63.7745, as applicable.[2] **(40 CFR 63.7752)**

3. For the EU-MP-S1 baghouse that is applied to meet any PM or Total Metal HAP emission limit, the permittee shall install, operate, and maintain a bag leak detection system according to the requirements in 40 CFR 63.7741(b) and conduct inspections according to the requirements specified in 40 CFR 63.7740(b)(1) through (8).[2] **(40 CFR 63.7740(b), 40 CFR 63.7741(b))**

4. For each emission unit in FG-NEWFOUNDRY-S1, the permittee shall demonstrate initial compliance with the work practice standards and the operation and maintenance requirements as specified in 40 CFR 63.7735 and 40 CFR 63.7736.[2] **(40 CFR 63.7735, 40 CFR 63.7736)**

5. The permittee shall monitor and collect data to demonstrate continuous compliance in accordance with 40 CFR 63.7742.[2] **(40 CFR 63.7742)**

6. The permittee shall demonstrate continuous compliance with all applicable emission limitations in accordance with 40 CFR 63.7743.[2] **(40 CFR 63.7743)**

7. The permittee shall maintain records that document continuous compliance with the requirements of 40 CFR 63.7700(b) or (c) as specified in 40 CFR 63.7744(a).[2] **(40 CFR 63.7744 (a))**

8. The permittee shall keep the following information on a monthly basis for FG-NEWFOUNDRY-S1[2]:
   a. Tons of metal melted per month.
   b. Monthly and previous 12-month PM-10, CO, and VOC emission rates, calculated as follows:

      Monthly PM-10, CO and VOC emission rates shall be calculated using the following emission factors, or the emission factors established during the most recent tests, whichever is greater:

      EU-MP-S1:
      0.018 lb PM-10/ton of melt
      2.70 lb CO/ton of melt
      0.32 lb VOC/ton of melt

      EU-MCS-S1:
      0.15 lb PM-10/ton of melt
      3.80 lb CO/ton of melt
      0.94 lb VOC/ton of melt

      EU-SS-S1:
      0.14 lb PM-10/ton of melt
      0.24 lb VOC/ton of melt

      EU-CCFBACK-S1:
      0.16 lb PM-10/ton of melt

   Monthly melt rates shall be multiplied with the appropriate factors from above to determine the monthly PM-10, CO and VOC mass emissions from each baghouse. These monthly emission rates will be added to the previous 11-month total emission rates of each PM-10, CO and VOC to determine 12-month rolling emission rates in tons per year for PM-10, CO and VOC. [Note: Alternate CO and VOC emission factors may be used upon prior approval from the District Supervisor.]

   All records shall be kept on file for a period of at least five years and made available to the Department upon request.[2] **(R 336.1225, R 336.1702(a), 40 CFR 52.21(j))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. The permittee shall report each instance, as applicable, in which each emission limitation and/or operating limit specified in 40 CFR 63.7690, each work practice standard specified in 40 CFR 63.7700, and each operation and maintenance requirement specified in 40 CFR 63.7710 was not met, in accordance with the requirements of 40 CFR 63.7751.[2] **(40 CFR 63.7746, 40 CFR 63.7751)**

5. The permittee shall submit applicable notifications specified in 40 CFR 63.6(h)(4) and (5), 40 CFR 63.7(b) and (c), 63.8(e), 63.8(f)(4) and (6), and 63.9(b) through (h) for an initial notification, a notification of intent to conduct a performance test, and a notification of compliance status as specified in 40 CFR 63.7750.[2] **(40 CFR 63.7750)**

6. The permittee shall submit all semiannual compliance reports and semiannual reports of monitoring and deviations from any emissions limitation or operation and maintenance requirement as required by 40 CFR 63.7751(a), (b), and (d)[2]. **(40 CFR 63.7751 (a), (b), and (d))**

7. If a startup, shutdown, or malfunction occurs during the semiannual reporting period, that is not consistent with the SSMP, the permittee shall submit an immediate SSM report according to the requirements of 40 CFR 63.10(d)(5)(ii).[2] **(40 CFR 63.10(d)(5)(ii), 40 CFR 63.7751(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
NA	NA	NA	NA

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR, Part 63, Subpart A and Subpart EEEEE for Iron and Steel Foundries by the initial compliance date.[2] **(40 CFR Part 63, Subparts A and EEEEE)**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-COATING-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Three GEOMET paint line systems each consisting of a mixing room, a paint spray booth equipped with HVLP applications and dry filter overspray control, and an induction cure process consisting of pre-curing and final cure steps for coating of metallic surfaces.

Emission Units: EULine1-S1, EULine2-S1, EULine3-S1

POLLUTION CONTROL EQUIPMENT

Dry filter overspray control

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOC	2,000 pounds per month[2]	Calendar month	EULine1-S1, EULine2-S1, EULine3-S1, (Each line)	SC VI.3	**R 336.1225, R 336.1702(d)**
2. VOC	10 tpy[2]	12-month rolling time period as determined at the end of each calendar month	EULine1-S1, EULine2-S1, EULine3-S1, (Each line)	SC VI.3	**R 336.1225, R 336.1702(d)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall capture all purge/clean-up solvents and waste coatings from all coating applications used in FG-COATING-S1. The permittee shall store these materials in closed containers and shall dispose of them in an acceptable manner in compliance with all applicable state rules and federal regulations.[2] **(R 336.1702(d))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall equip and maintain FG-COATING-S1 with high volume-low pressure (HVLP) spray applicators or comparable technology with equivalent transfer efficiency (e.g., electrostatic spray, dip, flowcoat, roller, dip-spin). For HVLP applicators, the permittee shall keep test caps available for pressure testing.[2] **(R 336.1702(d))**

2. The permittee shall not operate any FG-COATING-S1 paint spray booth unless all respective exhaust filters are installed, maintained and operated in a satisfactory manner.[2] **(R 336.1224, R 336.1301, R 336.1331, R 336.1910)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. Within 60 days of notification by the AQD, verification of VOC emissions and VOC content (in pounds per gallon) of any coating, reducer or purge/clean-up solvent, as applied or as received, using federal Reference Test Method 25A, Method 24 or other EPA approved reference method, may be required for continued operation. Verification of the emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test. Upon prior written approval by the AQD District Supervisor, VOC content may alternatively be determined from manufacturer's formulation data. If the Method 25A or Method 24 should differ from the formulation values, the permittee shall use the Method 25A or Method 24 results to determine compliance.[2] **(R 336.2001, R 336.2003, R 336.2004, R 336.1702(d))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the last day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition.[2] **(R 336.1225, R 336.1702(d))**

2. The permittee shall maintain a current listing from the manufacturer of the chemical composition of each coating, including the weight percent of each component. The data may consist of Material Safety Data Sheets, manufacturer's formulation data, or both as deemed acceptable by the AQD District Supervisor. The permittee shall keep all records and make them available to the Department upon request.[2] **(R 336.1224, R 336.1225, R 336.1702(d))**

3. The permittee shall keep the following information on a calendar month basis for FG-COATING-S1:
   a. Purchase orders and invoices for all coatings, reducers, and purge/clean-up solvents.
   b. VOC content, in pounds per gallon, of each coating, reducer and purge/clean-up solvent used.
   c. Gallons of each coating, reducer and purge/clean-up solvent used and reclaimed.
   d. VOC mass emission calculations determining the monthly emission rate for each coating line in pounds per calendar month.
   e. VOC mass emission calculations determining the annual emission rate for each coating line, in tons per 12-month rolling time period as determined at the end of each calendar month.

   The permittee shall keep the records in a format acceptable to the AQD District Supervisor. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1225, R 336.1702(d))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. Within 30 days after completion of the installation, construction, reconstruction, relocation, or modification authorized by this PTI, the permittee or the authorized agent pursuant to Rule 204, shall notify the AQD District Supervisor, in writing, of the completion of the activity. Completion of the installation, construction, reconstruction, relocation, or modification is considered to occur not later than commencement of trial operation of FG-COATING-S1.[2] **(R 336.1201(7)(a))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-MixRoom1	8[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
2. SV-SprayBooth1	24[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
3. SV-InducCure1	24[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
4. SV-MixRoom2	8[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
5. SV-SprayBooth2	24[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
6. SV-InducCure2	24[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
7. SV-MixRoom3	8[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
8. SV-SprayBooth3	24[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**
9. SV-InducCure3	24[2]	40[2]	**R 336.1225, R 336.1901, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-SOURCE-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

All metallic surface coating lines and all associated purge and cleanup operations at the stationary source. This includes any metallic surface coating line covered by this or any other general permit or any PTI issued pursuant to Rule 201, and any metallic surface coating line exempt from the requirement to obtain a PTI pursuant to Rule 287 and/or Rule 290.

Emission Unit: NA

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOC	30 tpy[2]	Based on a 12-month rolling time period as determined at the end of each calendar month	FG-SOURCE-S1	SC VI.2	**R 336.1225 R 336.1702(d)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
NA	NA	NA	NA	NA	NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

See Appendix 5

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the last day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition.[2] **(R 336.1225, R 336.1702(d))**

2. The permittee shall keep VOC mass emission calculations, on a monthly basis for FG-SOURCE-S1 determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month, for all metallic surface coating lines and associated purge and clean-up operation at the source. The permittee shall keep the records in a format acceptable to the AQD District Supervisor. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1225, R 336.1702(d))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
NA	NA	NA	NA

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-MACT MMMM-S1
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Each new, reconstructed, and existing affected source described in 40 CFR 63.3881(a)(1), including the subcategories listed in 40 CFR, Part 63, Subpart MMMM, 40 CFR 63.3881(a)(2) through (6), meeting the applicability requirements of 40 CFR 63.3881(b), which is engaged in the surface coating of miscellaneous metal parts and products. The affected source includes the collection of all the items listed in 40 CFR 63.3882(b)(1) through (4). Surface coating is defined by 40 CFR 63.3881 as the application of coating to a substrate using, for example, spray guns or dip tanks. Surface coating also includes associated activities, such as surface preparation, cleaning, mixing, and storage if they are directly related to the application of the coating. The 40 CFR, Part 63, Subpart MMMM, does not apply to surface coating or a coating operation that meets any of the criteria of 40 CFR 63.3881(c)(1) through (17).

Emission Units: EULine1-S1, EULine2-S1, EULine3-S1

POLLUTION CONTROL EQUIPMENT

Dry filter overspray control

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Organic HAP	1.9 lbs per gal of coating solids[2]	12-month rolling time period *	New or Reconstructed - General Use Coating	SC VI.1 through VI.5	**40 CFR 63.3890(a)(1)**
* As determined at the end of each calendar month.					

1. The permittee shall determine whether the organic HAP emission rate is equal to or less than the applicable emission limits in 40 CFR 63.3890 using at least one of the following three options, which are listed in 40 CFR 63.3891(a) through (c):
   a. Compliant material option,
   b. Emission rate without add-on controls option, or
   c. Emission rate with add-on controls option.

   The permittee shall include all coatings, thinners, and/or other additives, and cleaning materials used when determining the emission rate.[2] **(40 CFR 63.3891)**

2. Any coating operation(s) using the compliant material option or the emission rate without add-on controls option, shall be in compliance with the applicable emission limits in 40 CFR 63.3890 at all times.[2] **(40 CFR 63.3900(a)(1))**

3. If the surface coating operation(s) meet the applicability criteria of more than one of the subcategory emission limits specified in 40 CFR 63.3890(a) or (b), the permittee may comply separately with each subcategory emission limit, or comply using one of the alternatives in 40 CFR 63.3890(c)(1) or (2).[2] **(40 CFR 63.3890(c))**

II. MATERIAL LIMIT(S)

For the compliant materials option, the permittee shall meet the material limits specified in the following table.

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Each Thinner and/or Additive	No Organic HAP *[2]	Continuous	Each coating operation using compliant material option	SC VI.1, VI.2, VI.3, and VI.4	**40 CFR 63.3891(a)**
2. Each Cleaning Material	No Organic HAP *[2]	Continuous	Each coating operation using compliant material option	SC VI.1, VI.2, VI.3, and VI.4	**40 CFR 63.3891(a)**
* Determined according to 40 CFR 63.3941(a).					

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii), 40 CFR 63.3931)**

NA

See Appendix 5

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii), 40 CFR 63.3931)**

1. The permittee shall keep all records required by 40 CFR 63.3930 in the format and timeframes outlined in 40 CFR 63.3931.[2] **(40 CFR 63.3942(d), 40 CFR 63.3952(d), 40 CFR 63.3963(j))**

2. The permittee shall maintain, at a minimum, the following records for each compliance period[2]:
   a. A copy of each notification and report that is submitted to comply with Subpart MMMM, and the documentation supporting each notification and report. **(40 CFR 63.3930(a))**
   b. A current copy of information provided by materials suppliers or manufacturers, such as manufacturer's formulation data, or test data used to determine the mass fraction of organic HAP and density of each coating, thinner and/or other additive, and cleaning material, and the volume fraction of coating solids for each coating. **(40 CFR 63.3930(b))**
   c. A list of the coating operations on which each compliance option was used, and the beginning and ending dates and times for each compliance option used. **(40 CFR 63.3930(c)(1))**
   d. For the compliant materials option, the calculation of the organic HAP content for each coating, using Equation 2 of 40 CFR 63.3941. **(40 CFR 63.3930(c)(2))**
   e. For the emission rate without add-on controls option, the calculation of the total mass of organic HAP emissions for the coatings, thinners and/or additives, and cleaning materials used each month using Equations 1, 1A through 1C and 2 of 40 CFR 63.3951; and, if applicable, the calculation used to determine mass of organic HAP in waste materials according to 40 CFR 63.3951(e)(4); the calculation of the total volume of coating solids used each month using Equation 2 of 40 CFR 63.3951; and the calculation of each 12-month organic HAP emission rate using Equation 3 of 40 CFR 63.3951. **(40 CFR 63.3930(c)(3))**
   f. The name and mass or volume of each coating, thinner and/or other additive, and cleaning material used during each compliance period. If the compliant material option is used for all coatings at the affected

source, the permittee may maintain purchase records for each material used rather than a record of the volume used. **(40 CFR 63.3930(d))**

g. The mass fraction of organic HAP for each coating, thinner and/or additive, and cleaning material used during each compliance period unless the material is tracked by weight. **(40 CFR 63.3930(e))**

h. The volume fraction of coating solids for each coating used during each compliance period. **(40 CFR 63.3930(f))**

i. For either the emission rate without add-on controls option, the density of for each coating, thinner and/or other additive, and cleaning material used during each compliance period. **(40 CFR 63.3930(g))**

j. The information specified in 40 CFR 63.3930(h)(1) through (3), if an allowance is used in Equation 1 of 40 CFR 63.3951 for organic HAP contained in waste materials sent to or designated for shipment to a treatment, storage, and disposal facility (TSDF) according to 40 CFR 63.3951(e)(4). **(40 CFR 63.3930(h))**

k. The date, time, and duration of each deviation. **(40 CFR 63.3930(j))**

3. For each coating used for the compliant coating option, the permittee shall demonstrate continuous compliance with the emission limit in 40 CFR 63.3890, for each compliance period, using Equation 2 of 40 CFR 63.3941. For each thinner and cleaning material used, the permittee shall determine continuous compliance according to 40 CFR 63.3941(a).[2] **(40 CFR 63.3942)**

4. For any coating operation or group of coating operations using the emission rate without add-on controls option, the permittee shall demonstrate continuous compliance with the applicable organic HAP emission limit in 40 CFR 63.3890, for each compliance period, according to 40 CFR 63.3951(a) through (g).[2] **(40 CFR 63.3952)**

See Appendix 3-S1

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. For the compliant material option, if any coating used for any 12-month compliance period exceeds the applicable emission limit specified in 40 CFR 63.3890; or any thinner or cleaning material used contains any organic HAP, the permittee shall report this as a deviation as specified in 40 CFR 63.3910(c)(6) and 40 CFR 63.3920(a)(5).[2] **(40 CFR 63.3942(b))**

5. For the emission rate without add-on controls, if the organic HAP emission rate for any 12-month compliance period exceeds the applicable emission limit specified in 40 CFR 63.3890, the permittee shall report this as a deviation as specified in 40 CFR 63.3910(c)(6) and 40 CFR 63.3920(a)(6).[2]
(40 CFR 63.3952(b))

6. The permittee shall submit the applicable notifications specified in 40 CFR 63.7(b) and (c), 63.8(f)(4) and 63.9(b) through (e) and (h), an initial notification and a notification of compliance status as specified in 40 CFR 63.3910.[2] **(40 CFR Part 63, Subparts A and MMMM)**

7. The permittee shall submit all semiannual compliance reports specified in 40 CFR 63.3920(a). Each semiannual compliance report shall identify which coating operation(s) used each compliance option, and if there were no deviations from the emission limitations in 40 CFR 63.3890, include a statement that the coating operations were in compliance.[2] **(40 CFR 63.3920, 40 CFR 63.3942(c), 40 CFR 63.3952(c), 40 CFR 63.3963(f))**

See Appendix 8-S1

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
NA	NA	NA	NA

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR, Part 63, Subpart A and Subpart MMMM for Surface Coating of Miscellaneous Metal Parts and Products by the initial compliance date.[2] **(40 CFR Part 63, Subparts A and MMMM)**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

E. NON-APPLICABLE REQUIREMENTS

At the time of the ROP issuance, the AQD has determined that no non-applicable requirements have been identified for incorporation into the permit shield provision set forth in the General Conditions in Part A pursuant to Rule 213(6)(a)(ii).

APPENDICES

Appendix 1-S1. Abbreviations and Acronyms

The following is an alphabetical listing of abbreviations/acronyms that may be used in this permit.

AQD	Air Quality Division	MM	Million
acfm	Actual cubic feet per minute	MSDS	Material Safety Data Sheet
BACT	Best Available Control Technology	MW	Megawatts
BTU	British Thermal Unit	NA	Not Applicable
°C	Degrees Celsius	NAAQS	National Ambient Air Quality Standards
CAA	Federal Clean Air Act	NESHAP	National Emission Standard for Hazardous Air Pollutants
CAM	Compliance Assurance Monitoring	NMOC	Non-methane Organic Compounds
CEM	Continuous Emission Monitoring	NOx	Oxides of Nitrogen
CFR	Code of Federal Regulations	NSPS	New Source Performance Standards
CO	Carbon Monoxide	NSR	New Source Review
COM	Continuous Opacity Monitoring	PM	Particulate Matter
department	Michigan Department of Environmental Quality	PM-10	Particulate Matter less than 10 microns in diameter
dscf	Dry standard cubic foot	pph	Pound per hour
dscm	Dry standard cubic meter	ppm	Parts per million
EPA	United States Environmental Protection Agency	ppmv	Parts per million by volume
EU	Emission Unit	ppmw	Parts per million by weight
°F	Degrees Fahrenheit	PS	Performance Specification
FG	Flexible Group	PSD	Prevention of Significant Deterioration
GACS	Gallon of Applied Coating Solids	psia	Pounds per square inch absolute
GC	General Condition	psig	Pounds per square inch gauge
gr	Grains	PeTE	Permanent Total Enclosure
HAP	Hazardous Air Pollutant	PTI	Permit to Install
Hg	Mercury	RACT	Reasonable Available Control Technology
hr	Hour	ROP	Renewable Operating Permit
HP	Horsepower	SC	Special Condition
H_2S	Hydrogen Sulfide	scf	Standard cubic feet
HVLP	High Volume Low Pressure *	sec	Seconds
ID	Identification (Number)	SCR	Selective Catalytic Reduction
IRSL	Initial Risk Screening Level	SO_2	Sulfur Dioxide
ITSL	Initial Threshold Screening Level	SRN	State Registration Number
LAER	Lowest Achievable Emission Rate	TAC	Toxic Air Contaminant
lb	Pound	Temp	Temperature
m	Meter	THC	Total Hydrocarbons
MACT	Maximum Achievable Control Technology	tpy	Tons per year
MAERS	Michigan Air Emissions Reporting System	µg	Microgram
MAP	Malfunction Abatement Plan	VE	Visible Emissions
MDEQ	Michigan Department of Environmental Quality	VOC	Volatile Organic Compounds
mg	Milligram	yr	Year
mm	Millimeter		

*For HVLP applicators, the pressure measured at the gun air cap shall not exceed 10 pounds per square inch gauge (psig).

Appendix 2-S1. Schedule of Compliance

The permittee certified in the ROP application that this stationary source is in compliance with all applicable requirements and the permittee shall continue to comply with all terms and conditions of this ROP. A Schedule of Compliance is not required. **(R 336.1213(4)(a), R 336.1119(a)(ii))**

Appendix 3-S1. Monitoring Requirements

The following monitoring procedures, methods, or specifications are the details to the monitoring requirements identified and referenced in EU-MCS-S1. See the following.

VOC Monitoring CEMS Requirements

1. Within 60 days of completion of testing, the permittee shall submit to the AQD two copies of the final report demonstrating the CEMS complies with the requirements of Performance Specification (PS) 8.

2. The span value shall be 2.0 times the lowest emission standard or as specified in the federal regulations.

3. The CEMS shall be installed, calibrated, maintained, and operated in accordance with the procedures set forth in 40 CFR, Part 60.13 and PS 8 of Appendix B to 40 CFR, Part 60.

4. Each calendar quarter, the permittee shall perform the Quality Assurance Procedures of the CEMS set forth in Appendix F of 40 CFR, Part 60. Within 30 days following the end of each calendar quarter, the permittee shall submit the results to the AQD in the format of the data assessment report (Figure 1, Appendix F).

Appendix 4-S1. Recordkeeping

Specific recordkeeping requirement formats and procedures are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 5-S1. Testing Procedures

Specific testing requirement plans, procedures, and averaging times are detailed in the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 6-S1. Permits to Install/ROP Revision Applications

The following table lists any PTIs issued or ROP Revision Applications received since the effective date of the previously issued ROP No. MI-ROP-N5814-2006. Those ROP revision applications that are being issued concurrently with this ROP renewal are identified by an asterisk (*). Those revision applications not listed with an asterisk were processed prior to this renewal.

Source-Wide PTI No. MI-PTI-N5814-2006 is being reissued as Source-Wide PTI No. MI-PTI-N5814-2015.

Permit to Install Number	ROP Revision Application Number	Description of Equipment or Change	Corresponding Emission Unit(s) or Flexible Group(s)
280-06A	Administrative Amendment application #200900035*	Installation and operation of a new foundry used to produce gray iron.	EU-MP-S1, EU-MCS-S1, EU-SS-S1, EU-CCFFRONT-S1, EU-CCFBACK-S1
177-11	Minor Modification application #201200036*	Installation of three new coating lines.	EULine1-S1, EULine2-S1, EULine3-S1
280-06B	Minor Modification application #201400006*	Installation of regenerative thermal oxidizer control equipment to control VOHAP emissions from EU-MCS-S1.	EU-MCS-S1, FG-NEWFOUNDRY-S1

Appendix 7-S1. Emission Calculations

The permittee shall use the following calculations in conjunction with monitoring, testing or recordkeeping data to determine compliance with the applicable requirements referenced in the SOURCE-WIDE table.

Table 7.1
Summary of HAPs emission factors from the MPCC and SS stacks

Pollutant	MPCC Stack	SS Stack
	lb/ton iron melt	lb/ton iron melt
Single HAP	0.07	0.21
(Benzene)		
Total HAPS	0.11	0.60

Appendix 8-S1. Reporting

A. Annual, Semiannual, and Deviation Certification Reporting

The permittee shall use the MDEQ, AQD, Report Certification form (EQP 5736) and MDEQ, AQD, Deviation Report form (EQP 5737) for the annual, semiannual and deviation certification reporting referenced in the Reporting Section of the Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Alternative formats must meet the provisions of Rule 213(4)(c) and Rule 213(3)(c)(i), respectively, and be approved by the AQD District Supervisor.

B. Other Reporting

Specific reporting requirement formats and procedures are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, Part B of this appendix is not applicable.

Section 2 – Gokoh Coldwater, Inc.

A. GENERAL CONDITIONS

Permit Enforceability

- All conditions in this permit are both federally enforceable and state enforceable unless otherwise noted. **(R 336.1213(5))**

- Those conditions that are hereby incorporated in a state-only enforceable Source-Wide PTI pursuant to Rule 201(2)(d) are designated by footnote one. **(R 336.1213(5)(a), R 336.1214a(5))**

- Those conditions that are hereby incorporated in a federally enforceable Source-Wide PTI pursuant to Rule 201(2)(c) are designated by footnote two. **(R 336.1213(5)(b), R 336.1214a(3))**

General Provisions

1. The permittee shall comply with all conditions of this ROP. Any ROP noncompliance constitutes a violation of Act 451, and is grounds for enforcement action, for ROP revocation or revision, or for denial of the renewal of the ROP. All terms and conditions of this ROP that are designated as federally enforceable are enforceable by the Administrator of the United States Environmental Protection Agency (USEPA) and by citizens under the provisions of the federal Clean Air Act (CAA). Any terms and conditions based on applicable requirements which are designated as "state-only" are not enforceable by the USEPA or citizens pursuant to the CAA. **(R 336.1213(1)(a))**

2. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this ROP. **(R 336.1213(1)(b))**

3. This ROP may be modified, revised, or revoked for cause. The filing of a request by the permittee for a permit modification, revision, or termination, or a notification of planned changes or anticipated noncompliance does not stay any ROP term or condition. This does not supersede or affect the ability of the permittee to make changes, at the permittee's own risk, pursuant to Rule 215 and Rule 216. **(R 336.1213(1)(c))**

4. The permittee shall allow the department, or an authorized representative of the department, upon presentation of credentials and other documents as may be required by law and upon stating the authority for and purpose of the investigation, to perform any of the following activities **(R 336.1213(1)(d))**:
   a. Enter, at reasonable times, a stationary source or other premises where emissions-related activity is conducted or where records must be kept under the conditions of the ROP.
   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the ROP.
   c. Inspect, at reasonable times, any of the following:
      i. Any stationary source.
      ii. Any emission unit.
      iii. Any equipment, including monitoring and air pollution control equipment.
      iv. Any work practices or operations regulated or required under the ROP.
   d. As authorized by Section 5526 of Act 451, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the ROP or applicable requirements.

5. The permittee shall furnish to the department, within a reasonable time, any information the department may request, in writing, to determine whether cause exists for modifying, revising, or revoking the ROP or to determine compliance with this ROP. Upon request, the permittee shall also furnish to the department copies of any records that are required to be kept as a term or condition of this ROP. For information which is claimed by the permittee to be confidential, consistent with the requirements of the 1976 PA 442, MCL §15.231 et seq., and known as the Freedom of Information Act, the person may also be required to furnish the records directly to the USEPA together with a claim of confidentiality. **(R 336.1213(1)(e))**

6. A challenge by any person, the Administrator of the USEPA, or the department to a particular condition or a part of this ROP shall not set aside, delay, stay, or in any way affect the applicability or enforceability of any other condition or part of this ROP. **(R 336.1213(1)(f))**

7. The permittee shall pay fees consistent with the fee schedule and requirements pursuant to Section 5522 of Act 451. **(R 336.1213(1)(g))**

8. This ROP does not convey any property rights or any exclusive privilege. **(R 336.1213(1)(h))**

Equipment & Design

9. Any collected air contaminants shall be removed as necessary to maintain the equipment at the required operating efficiency. The collection and disposal of air contaminants shall be performed in a manner so as to minimize the introduction of contaminants to the outer air. Transport of collected air contaminants in Priority I and II areas requires the use of material handling methods specified in Rule 370(2). **(R 336.1370)**

10. Any air cleaning device shall be installed, maintained, and operated in a satisfactory manner and in accordance with the Michigan Air Pollution Control rules and existing law. **(R 336.1910)**

Emission Limits

11. Unless otherwise specified in this ROP, the permittee shall comply with Rule 301, which states, in part, "Except as provided in subrules 2, 3, and 4 of this rule, a person shall not cause or permit to be discharged into the outer air from a process or process equipment a visible emission of a density greater than the most stringent of the following: **(R 336.1301(1))**
    a. A 6-minute average of 20 percent opacity, except for one 6-minute average per hour of not more than 27 percent opacity.
    b. A limit specified by an applicable federal new source performance standard.

    The grading of visible emissions shall be determined in accordance with Rule 303.

12. The permittee shall not cause or permit the emission of an air contaminant or water vapor in quantities that cause, alone or in reaction with other air contaminants, either of the following:
    a. Injurious effects to human health or safety, animal life, plant life of significant economic value, or property.[1] **(R 336.1901(a))**
    b. Unreasonable interference with the comfortable enjoyment of life and property.[1] **(R 336.1901(b))**

Testing/Sampling

13. The department may require the owner or operator of any source of an air contaminant to conduct acceptable performance tests, at the owner's or operator's expense, in accordance with Rule 1001 and Rule 1003, under any of the conditions listed in Rule 1001(1). **(R 336.2001)**

14. Any required performance testing shall be conducted in accordance with Rule 1001(2), Rule 1001(3) and Rule 1003. **(R 336.2001(2), R 336.2001(3), R 336.2003(1))**

15. Any required test results shall be submitted to the Air Quality Division (AQD) in the format prescribed by the applicable reference test method within 60 days following the last date of the test. **(R 336.2001(5))**

Monitoring/Recordkeeping

16. Records of any periodic emission or parametric monitoring required in this ROP shall include the following information specified in Rule 213(3)(b)(i), where appropriate **(R 336.1213(3)(b))**:
    a. The date, location, time, and method of sampling or measurements.
    b. The dates the analyses of the samples were performed.
    c. The company or entity that performed the analyses of the samples.
    d. The analytical techniques or methods used.
    e. The results of the analyses.
    f. The related process operating conditions or parameters that existed at the time of sampling or measurement.

17. All required monitoring data, support information and all reports, including reports of all instances of deviation from permit requirements, shall be kept and furnished to the department upon request for a period of not less than 5 years from the date of the monitoring sample, measurement, report or application. Support information includes all calibration and maintenance records and all original strip-chart recordings, or other original data records, for continuous monitoring instrumentation and copies of all reports required by the ROP. **(R 336.1213(1)(e), R 336.1213(3)(b)(ii))**

Certification & Reporting

18. Except for the alternate certification schedule provided in Rule 213(3)(c)(iii)(B), any document required to be submitted to the department as a term or condition of this ROP shall contain an original certification by a Responsible Official which states that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete. **(R 336.1213(3)(c))**

19. A Responsible Official shall certify to the appropriate AQD District Office and to the USEPA that the stationary source is and has been in compliance with all terms and conditions contained in the ROP except for deviations that have been or are being reported to the appropriate AQD District Office pursuant to Rule 213(3)(c). This certification shall include all the information specified in Rule 213(4)(c)(i) through (v) and shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the certification are true, accurate, and complete. The USEPA address is: USEPA, Air Compliance Data - Michigan, Air and Radiation Division, 77 West Jackson Boulevard, Chicago, Illinois 60604. **(R 336.1213(4)(c))**

20. The certification of compliance shall be submitted annually for the term of this ROP as detailed in the special conditions, or more frequently if specified in an applicable requirement or in this ROP. **(R 336.1213(4)(c))**

21. The permittee shall promptly report any deviations from ROP requirements and certify the reports. The prompt reporting of deviations from ROP requirements is defined in Rule 213(3)(c)(ii) as follows, unless otherwise described in this ROP. **(R 336.1213(3)(c))**
    a. For deviations that exceed the emissions allowed under the ROP, prompt reporting means reporting consistent with the requirements of Rule 912 as detailed in Condition 25. All reports submitted pursuant to this paragraph shall be promptly certified as specified in Rule 213(3)(c)(iii).
    b. For deviations which exceed the emissions allowed under the ROP and which are not reported pursuant to Rule 912 due to the duration of the deviation, prompt reporting means the reporting of all deviations in the semiannual reports required by Rule 213(3)(c)(i). The report shall describe reasons for each deviation and the actions taken to minimize or correct each deviation.
    c. For deviations that do not exceed the emissions allowed under the ROP, prompt reporting means the reporting of all deviations in the semiannual reports required by Rule 213(3)(c)(i). The report shall describe the reasons for each deviation and the actions taken to minimize or correct each deviation.

22. For reports required pursuant to Rule 213(3)(c)(ii), prompt certification of the reports is described in Rule 213(3)(c)(iii) as either of the following **(R 336.1213(3)(c))**:
    a. Submitting a certification by a Responsible Official with each report which states that, based on information and belief formed after reasonable inquiry, the statements and information in the report are true, accurate, and complete.
    b. Submitting, within 30 days following the end of a calendar month during which one or more prompt reports of deviations from the emissions allowed under the ROP were submitted to the department pursuant to Rule 213(3)(c)(ii), a certification by a Responsible Official which states that, "based on information and belief formed after reasonable inquiry, the statements and information contained in each of the reports submitted during the previous month were true, accurate, and complete". The certification shall include a listing of the reports that are being certified. Any report submitted pursuant to Rule 213(3)(c)(ii) that will be certified on a monthly basis pursuant to this paragraph shall include a statement that certification of the report will be provided within 30 days following the end of the calendar month.

23. Semiannually for the term of the ROP as detailed in the special conditions, or more frequently if specified, the permittee shall submit certified reports of any required monitoring to the appropriate AQD District Office. All instances of deviations from ROP requirements during the reporting period shall be clearly identified in the reports. **(R 336.1213(3)(c)(i))**

24. On an annual basis, the permittee shall report the actual emissions, or the information necessary to determine the actual emissions, of each regulated air pollutant as defined in Rule 212(6) for each emission unit utilizing the emissions inventory forms provided by the department. **(R 336.1212(6))**

25. The permittee shall provide notice of an abnormal condition, start-up, shutdown, or malfunction that results in emissions of a hazardous or toxic air pollutant which continue for more than one hour in excess of any applicable standard or limitation, or emissions of any air contaminant continuing for more than two hours in excess of an applicable standard or limitation, as required in Rule 912, to the appropriate AQD District Office. The notice shall be provided not later than two business days after the start-up, shutdown, or discovery of the abnormal conditions or malfunction. Notice shall be by any reasonable means, including electronic, telephonic, or oral communication. Written reports, if required under Rule 912, must be submitted to the appropriate AQD District Supervisor within 10 days after the start-up or shutdown occurred, within 10 days after the abnormal conditions or malfunction has been corrected, or within 30 days of discovery of the abnormal conditions or malfunction, whichever is first. The written reports shall include all of the information required in Rule 912(5) and shall be certified by a Responsible Official in a manner consistent with the CAA. **(R 336.1912)**

Permit Shield

26. Compliance with the conditions of the ROP shall be considered compliance with any applicable requirements as of the date of ROP issuance, if either of the following provisions is satisfied. **(R 336.1213(6)(a)(i), R 336.1213(6)(a)(ii))**
    a. The applicable requirements are included and are specifically identified in the ROP.
    b. The permit includes a determination or concise summary of the determination by the department that other specifically identified requirements are not applicable to the stationary source.

    Any requirements identified in Part E of this ROP have been identified as non-applicable to this ROP and are included in the permit shield.

27. Nothing in this ROP shall alter or affect any of the following:
    a. The provisions of Section 303 of the CAA, emergency orders, including the authority of the USEPA under Section 303 of the CAA. **(R 336.1213(6)(b)(i))**
    b. The liability of the owner or operator of this source for any violation of applicable requirements prior to or at the time of this ROP issuance. **(R 336.1213(6)(b)(ii))**
    c. The applicable requirements of the acid rain program, consistent with Section 408(a) of the CAA. **(R 336.1213(6)(b)(iii))**

d. The ability of the USEPA to obtain information from a source pursuant to Section 114 of the CAA. **(R 336.1213(6)(b)(iv))**

28. The permit shield shall not apply to provisions incorporated into this ROP through procedures for any of the following:
    a. Operational flexibility changes made pursuant to Rule 215. **(R 336.1215(5))**
    b. Administrative Amendments made pursuant to Rule 216(1)(a)(i)-(iv). **(R 336.1216(1)(b)(iii))**
    c. Administrative Amendments made pursuant to Rule 216(1)(a)(v) until the amendment has been approved by the department. **(R 336.1216(1)(c)(iii))**
    d. Minor Permit Modifications made pursuant to Rule 216(2). **(R 336.1216(2)(f))**
    e. State-Only Modifications made pursuant to Rule 216(4) until the changes have been approved by the department. **(R 336.1216(4)(e))**

29. Expiration of this ROP results in the loss of the permit shield. If a timely and administratively complete application for renewal is submitted not more than 18 months, but not less than 6 months, before the expiration date of the ROP, but the department fails to take final action before the end of the ROP term, the existing ROP does not expire until the renewal is issued or denied, and the permit shield shall extend beyond the original ROP term until the department takes final action. **(R 336.1217(1)(c), R 336.1217(1)(a))**

Revisions

30. For changes to any process or process equipment covered by this ROP that do not require a revision of the ROP pursuant to Rule 216, the permittee must comply with Rule 215. **(R 336.1215, R 336.1216)**

31. A change in ownership or operational control of a stationary source covered by this ROP shall be made pursuant to Rule 216(1). **(R 336.1219(2))**

32. For revisions to this ROP, an administratively complete application shall be considered timely if it is received by the department in accordance with the time frames specified in Rule 216. **(R 336.1210(9))**

33. Pursuant to Rule 216(1)(b)(iii), Rule 216(2)(d) and Rule 216(4)(d), after a change has been made, and until the department takes final action, the permittee shall comply with both the applicable requirements governing the change and the ROP terms and conditions proposed in the application for the modification. During this time period, the permittee may choose to not comply with the existing ROP terms and conditions that the application seeks to change. However, if the permittee fails to comply with the ROP terms and conditions proposed in the application during this time period, the terms and conditions in the ROP are enforceable. **(R 336.1216(1)(c)(iii), R 336.1216(2)(d), R 336.1216(4)(d))**

Reopenings

34. A ROP shall be reopened by the department prior to the expiration date and revised by the department under any of the following circumstances:
    a. If additional requirements become applicable to this stationary source with three or more years remaining in the term of the ROP, but not if the effective date of the new applicable requirement is later than the ROP expiration date. **(R 336.1217(2)(a)(i))**
    b. If additional requirements pursuant to Title IV of the CAA become applicable to this stationary source. **(R 336.1217(2)(a)(ii))**
    c. If the department determines that the ROP contains a material mistake, information required by any applicable requirement was omitted, or inaccurate statements were made in establishing emission limits or the terms or conditions of the ROP. **(R 336.1217(2)(a)(iii))**
    d. If the department determines that the ROP must be revised to ensure compliance with the applicable requirements. **(R 336.1217(2)(a)(iv))**

Renewals

35. For renewal of this ROP, an administratively complete application shall be considered timely if it is received by the department not more than 18 months, but not less than 6 months, before the expiration date of the ROP. **(R 336.1210(7))**

Stratospheric Ozone Protection

36. If the permittee is subject to Title 40 of the Code of Federal Regulations (CFR), Part 82 and services, maintains, or repairs appliances except for motor vehicle air conditioners (MVAC), or disposes of appliances containing refrigerant, including MVAC and small appliances, or if the permittee is a refrigerant reclaimer, appliance owner or a manufacturer of appliances or recycling and recovery equipment, the permittee shall comply with all applicable standards for recycling and emissions reduction pursuant to 40 CFR, Part 82, Subpart F.

37. If the permittee is subject to 40 CFR, Part 82, and performs a service on motor (fleet) vehicles when this service involves refrigerant in the MVAC, the permittee is subject to all the applicable requirements as specified in 40 CFR, Part 82, Subpart B, Servicing of Motor Vehicle Air Conditioners. The term "motor vehicle" as used in Subpart B does not include a vehicle in which final assembly of the vehicle has not been completed by the original equipment manufacturer. The term MVAC as used in Subpart B does not include the air-tight sealed refrigeration system used for refrigerated cargo or an air conditioning system on passenger buses using Hydrochlorofluorocarbon-22 refrigerant.

Risk Management Plan

38. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall register and submit to the USEPA the required data related to the risk management plan for reducing the probability of accidental releases of any regulated substances listed pursuant to Section 112(r)(3) of the CAA as amended in 40 CFR 68.130. The list of substances, threshold quantities, and accident prevention regulations promulgated under 40 CFR, Part 68, do not limit in any way the general duty provisions under Section 112(r)(1).

39. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall comply with the requirements of 40 CFR, Part 68, no later than the latest of the following dates as provided in 40 CFR 68.10(a):
    a. June 21, 1999,
    b. Three years after the date on which a regulated substance is first listed under 40 CFR 68.130, or
    c. The date on which a regulated substance is first present above a threshold quantity in a process.

40. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall submit any additional relevant information requested by any regulatory agency necessary to ensure compliance with the requirements of 40 CFR, Part 68.

41. If subject to Section 112(r) of the CAA and 40 CFR, Part 68, the permittee shall annually certify compliance with all applicable requirements of Section 112(r) as detailed in Rule 213(4)(c)). **(40 CFR, Part 68)**

Emission Trading

42. Emission averaging and emission reduction credit trading are allowed pursuant to any applicable interstate or regional emission trading program that has been approved by the Administrator of the USEPA as a part of Michigan's State Implementation Plan. Such activities must comply with Rule 215 and Rule 216. **(R 336.1213(12))**

Permit To Install (PTI)

43. The process or process equipment included in this permit shall not be reconstructed, relocated, or modified unless a PTI authorizing such action is issued by the department, except to the extent such action is exempt from the PTI requirements by any applicable rule. [2] **(R 336.1201(1))**

44. The department may, after notice and opportunity for a hearing, revoke PTI terms or conditions if evidence indicates the process or process equipment is not performing in accordance with the terms and conditions of the PTI or is violating the department's rules or the CAA. [2] **(R 336.1201(8), Section 5510 of Act 451)**

45. The terms and conditions of a PTI shall apply to any person or legal entity that now or hereafter owns or operates the process or process equipment at the location authorized by the PTI. If a new owner or operator submits a written request to the department pursuant to Rule 219 and the department approves the request, this PTI will be amended to reflect the change of ownership or operational control. The request must include all of the information required by Subrules (1)(a), (b) and (c) of Rule 219. The written request shall be sent to the appropriate AQD District Supervisor, MDEQ. [2] **(R 336.1219)**

46. If the installation, reconstruction, relocation, or modification of the equipment for which PTI terms and conditions have been approved has not commenced within 18 months of the original PTI issuance date, or has been interrupted for 18 months, the applicable terms and conditions from that PTI, as incorporated into the ROP, shall become void unless otherwise authorized by the department. Furthermore, the person to whom that PTI was issued, or the designated authorized agent, shall notify the department via the Supervisor, Permit Section, MDEQ, AQD, P. O. Box 30260, Lansing, Michigan 48909, if it is decided not to pursue the installation, reconstruction, relocation, or modification of the equipment allowed by the terms and conditions from that PTI. [2] **(R 336.1201(4))**

Footnotes:
[1]This condition is state-only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

B. SOURCE-WIDE CONDITIONS

Part B outlines the Source-Wide Terms and Conditions that apply to this stationary source. The permittee is subject to these special conditions for the stationary source in addition to the general conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply to this source, NA (not applicable) has been used in the table. If there are no Source-Wide Conditions, this section will be left blank.

C. EMISSION UNIT CONDITIONS

Part C outlines terms and conditions that are specific to individual emission units listed in the Emission Unit Summary Table. The permittee is subject to the special conditions for each emission unit in addition to the General Conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply, NA (not applicable) has been used in the table. If there are no conditions specific to individual emission units, this section will be left blank.

EMISSION UNIT SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EU-SHELLCORE-S2	Seven shell core machines with horizontal exhaust to ambient air. Core wash tank (limited use) with dust collector control exhausted inside the building.	12/02/11	NA
EU-SILOS-S2	Two 75-ton capacity sand storage silos, sand handling equipment, and two sand mixers (sand is mixed with resin) with a fabric filter dust collection system. #1, 8,500 cfm. Includes transfer of sand from trucks to the silo and pneumatic sand feed through enclosed piping from the silo.	12/02/11	NA
EU-LAEMPE#1AND#2-S2	Two Laempe cold box core machines. Phenolic urethane cold box core making process. Mixed sand/resin is set to make cores. The Triethylamine (TEA) catalyst. Emission control is two Dakota acid scrubbers, 3,850 cfm each. Equipment includes two Laempe core making machines and two natural gas fired core ovens, 1.5 MMBtu/hr each; 1.33 tons/hr. nominal throughput capacity.	12/02/11	NA
EU-MISCELLANEOUS-S2	Use of materials ancillary to the core making process including daub/mud, glue/paste, coating, core box release agent, and metal cleaners.	12/02/11	NA

EU-SHELLCORE-S2
EMISSION UNIT CONDITIONS

DESCRIPTION

Seven shell core machines with horizontal exhaust to ambient air. Core wash tank (limited use) with dust collector control exhausted inside building.

Flexible Group ID: NA

POLLUTION CONTROL EQUIPMENT

Horizontal exhaust to ambient air from shell core machines at 9,300 cfm. 2,400 cfm dust collector on the wash tank exhausted inside the building.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOC	1.0 tpy[2]	12-month rolling time period as determined at the end of each calendar month	EU-SHELLCORE-S2	SC VI.1	**R 336.1702(a)**

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate the EU-SHELLCORE-S2 core wash tank unless the dust collector is installed, maintained, and operated in a satisfactory manner. Satisfactory operation includes, but is not limited to, venting the dust collector exhaust inside the building.[2] **(R 336.1301, R 336.1331, R 336.1910)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall calculate the VOC emission rates from EU-SHELLCORE-S2 for each calendar month and 12-month rolling time period using a method acceptable to the AQD District Supervisor. The permittee shall keep all records on file at the facility and make them available to the Department upon request.[2] **(R 336.1702)**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S2

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SVSHELLCORE[A]	24[2]	14[2]	**R 336.2803, R 336.2804, 40 CFR 52.21 (c) & (d)**
[A]Exhaust is vented horizontally to the ambient air			

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-SILOS-S2
EMISSION UNIT CONDITIONS

DESCRIPTION

Two 75-ton capacity sand storage silos, sand handling equipment, and two sand mixers (sand is mixed with resin) with a fabric filter dust collection system. #1, 8500 cfm.

Includes transfer of sand from trucks to the silo and pneumatic sand feed through enclosed piping from the silo.

Flexible Group ID: NA

POLLUTION CONTROL EQUIPMENT

Fabric filter dust collection system #1, 8500 cfm

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. PM	0.10 lb/1,000 lb exhaust gas[2]	Test Protocol*	EU-SILOS-S2	SC VI.5, VI.6	**R 336.1331**
2. PM	2.50 tpy[2]	12-month rolling time period as determined at the end of each calendar month	EU-SILOS-S2	SC VI.4	**R 336.1331**
*Test Protocol shall specify averaging time					

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Sand	25,000 tons/yr throughput[2]	12-month rolling time period as determined at the end of each calendar month	EU-SILOS-S2	SC VI.1	**R 336.1205(3) R 336.1331**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall not operate EU-SILOS-S2 unless a malfunction abatement plan (MAP) as described in Rule 911(2), for the sand storage and handling operations, has been submitted within 90 days of permit issuance, and is implemented and maintained.[2] **(R 336.1331, R 336.1910, R 336.1911, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-SILOS-S2 unless the fabric filter system is installed, maintained, and operated in a satisfactory manner.[2] **(R 336.1205(3), R 336.1301, R 336.1331, R 336.1910)**

2. The permittee shall not operate EU-SILOS-S2 unless a gauge, which continuously measures the pressure drop across the fabric filter dust collection system is installed, maintained and operated in a satisfactory manner.[2] **(R 336.1301, R 336.1331, R 336.1910)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall monitor and record, in a satisfactory manner, the sand usage for EU-SILOS-S2 on a monthly and 12-month rolling time period basis. The permittee shall keep all records on file at the facility and make them available to the Department upon request.[2] **(R 336.1205, R 336.1301, R 336.1331)**

2. The permittee shall monitor and record, in a satisfactory manner, the pressure drop across the EU-SILOS-S2 fabric filter dust collection system on an each operational day basis.[2] **(R 336.1301, R 336.1331, R 336.1910)**

3. The permittee shall keep, in a satisfactory manner, all daily records of the EU-SILOS-S2 fabric filter dust collection system pressure drop, as required by SC VI.2 on file at the facility and make them available to the Department upon request.[2] **(R 336.1301, R 336.1331, R 336.1910)**

4. The permittee shall calculate the PM emission rates from EU-SILOS-S2 for each calendar month and 12-month rolling time period using a method acceptable to the AQD District Supervisor. The permittee shall keep all records on file at the facility and make them available to the Department upon request.[2] **(R 336.1331)**

5. The permittee shall verify the presence of visible emissions by taking six-minute visible emission readings from EU-SILOS-S2 a minimum of once per week. Either a certified or non-certified reader shall take each visible emission reading during routine operating conditions. Multiple stacks may be observed simultaneously. If the permittee observes any visible emissions, the permittee shall immediately implement the following procedures:[2]
   a. The permittee shall perform the six-minute visible emission readings at least once every 30 minutes until emissions are no longer visible or until emissions have been observed for more than two hours.[2]
   b. If visible emissions have been observed for more than two hours, a certified reader shall determine the opacity using Federal Reference Test Method 9 (40 CFR Part 60, Appendix A).[2]
   c. If the results of the Federal Reference Test Method 9 visible emission observation indicate a violation of the opacity standard specified in GC 11, the permittee shall immediately initiate corrective actions.[2]
   (R 336.1301, R 336.1303)

6. The permittee shall keep, in a satisfactory manner, records of all visible emission readings from EU-SILOS-S2. At a minimum, records shall include the date, time, name of observer/reader, whether the reader is certified, and status of visible emissions. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1301, R 336.1303, R 336.1910)**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S2

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1.SVSILOS	18[2]	25[2]	**R 336.2803, R 336.2804, 40 CFR 52.21 (c) & (d)**

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-LAEMPE#1AND#2-S2
EMISSION UNIT CONDITIONS

DESCRIPTION

Two Laempe cold box core machines.

A phenolic urethane cold box core making process. Mixed sand/resin is set to make cores. The TEA catalyst. Emission control is two Dakota acid scrubbers, 3850 cfm each.

Equipment includes two Laempe core making machines and two natural gas fired core ovens, 1.5 MMBtu/hr. each; 1.33 tons/hr. nominal throughput capacity.

Flexible Group ID: NA

POLLUTION CONTROL EQUIPMENT

The TEA catalyst emissions controlled by two Dakota packed tower acid scrubbers, 3850 cfm each

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOC	1.54 tpy[2]	12-month rolling time period as determined at the end of each calendar month	EU-LAEMPE#1AND#2-S2	SC VI.3	**R 336.1702**
2. TEA	1 ppmv (or 99% reduction)[2]	Test Protocol*	EU-LAEMPE#1AND#2-S2	SC V.1	**R 336.1225, 40 CFR 63.7690 (a)(11)(i) or (ii)**
3. Visible Emissions	20% opacity (except for one 6-minute average per hour of not more than 27% opacity)[2]	Test Protocol*	Any building or structure housing EU-LAEMPE#1AND#2-S2	SC V.2	**40 CFR 63.7690 (a)(7)**
*Test Protocol shall specify averaging time					

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Resin Part A	115 tons/yr throughput[2]	12-month rolling time period as determined at the end of each calendar month	EU-LAEMPE#1AND#2-S2	SC VI.1	**R 336.1702**
2. Resin Part B	115 tons/yr throughput[2]	12-month rolling time period as determined at the end of each calendar month	EU-LAEMPE#1AND#2-S2	SC VI.1	**R 336.1702**
3. Catalyst TEA	35 tons/yr throughput[2]	12-month rolling time period as determined at the end of each calendar month	EU-LAEMPE#1AND#2-S2	SC VI.1	**R 336.1702**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall burn only natural gas in the core ovens of EU-LAEMPE#1AND#2-S2.[2] **(R 336.1225, R 336.1702, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d))**

2. The permittee shall submit to the AQD District Supervisor, implement, and maintain an approvable operation and maintenance plan for the EU-LAEMPE#1AND#2-S2 packed tower scrubber system. The plan shall contain all information required by 40 CFR 63.7710(b).[2] **(40 CFR 63.7710(b), 40 CFR 63.7745)**

3. The permittee shall not operate EU-LAEMPE#1AND#2-S2 unless the packed tower scrubber system 3-hour average pH of the scrubber blowdown, as measured by a continuous parameter monitoring system, does not exceed 4.5 OR the pH of the scrubber blowdown, as measured once every 8 hours during process operations, does not exceed 4.5.[2] **(R 336.1225, R 336.1702, R 336.1901, R 336.1910, 40 CFR 63.7690(b)(5))**

4. The permittee shall not operate EU-LAEMPE#1AND#2-S2 unless the packed tower scrubber system 3-hour average scrubbing liquid flow rate is maintained at or above the minimum level established during the initial or subsequent performance test.[2] **(R 336.1225, R 336.1702, R 336.1901, R 336.1910, 40 CFR 63.7690(b)(5))**

5. The permittee shall operate and maintain the air pollution control and monitoring equipment in a manner consistent with good air pollution control practices for minimizing emissions.[2] **(40 CFR 63.6(e)(1)(1), 40 CFR 63.7710(a))**

6. The permittee shall comply with the applicable emission limitations, work practice standards, and operation and maintenance requirements in 40 CFR Part 63, Subpart EEEEE at all times, except during periods of startup, shutdown, or malfunction.[2] **(40 CFR 63.7720(a))**

7. The permittee shall develop and implement a written startup, shutdown, and malfunction plan in accordance with 40 CFR 63.6(e)(3).[2] **(40 CFR 63.7720(c))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate EU-LAEMPE#1AND#2-S2 unless the packed tower scrubber system is installed, maintained, and operated in a satisfactory manner. Satisfactory operation includes, but is not limited to, installing and maintaining the scrubber according to the provisions outlined in 40 CFR 63.7690(b) and 40 CFR 63.7710.[2] **(R 336.1225, 40 CFR 63.7690(b), 40 CFR 63.7710)**

2. The permittee shall install, calibrate, maintain and operate in a satisfactory manner, a continuous parameter monitoring system for the EU-LAEMPE#1AND#2-S2 packed tower scrubber system according to the provisions outlined in 40 CFR 63.7690(b) and 40 CFR 63.7741.[2] **(R 336.1225, R 336.1702, R 336.1910, 40 CFR 63.7690(b), 40 CFR 63.7740, 40 CFR 63.7741)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. No less frequently than every 5 years and each time the permittee elects to change an operating limit or to comply with a different alternative emissions limit, the permittee shall demonstrate compliance with the TEA emission limitations from EU-LAEMPE#1AND#2-S2 by subsequent testing at owner's expense, in accordance with 40 CFR Part 63, Subparts A and EEEEE. No less than 60 days prior to testing, the permittee shall submit a complete test plan to the AQD Technical Programs Unit and District Office. The AQD must approve the final plan prior to testing. Verification of compliance with the emission limitations includes the submittal of a complete report of the test results to the AQD Technical Programs Unit and District Office within 60 days following the last date of the test.[2] **(40 CFR 63.7731(a), 40 CFR 63.7743)**

2. No less frequently than once every 6 months, the permittee shall demonstrate compliance with the opacity limitation from EU-LAEMPE#1AND#2-S2 by subsequent testing at owner's expense, in accordance with 40 CFR Part 63, Subparts A and EEEEE. No less than 60 days prior to testing, the permittee shall submit a

notification of intent to perform a compliance test to the AQD Technical Programs Unit and District Office. Verification of compliance with the limitation includes the submittal of a complete report of the test results to the AQD Technical Programs Unit and District Office within 60 days following the last date of the test.[2] **(40 CFR 63.7731(b), 40 CFR 63.7743)**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall monitor and record, in a satisfactory manner, the resin and catalyst usage for EU-LAEMPE#1AND#2-S2 on a monthly and 12-month rolling time period basis.[2] **(R 336.1225, R 336.1702)**

2. The permittee shall monitor and record the EU-LAEMPE#1AND#2-S2 packed tower scrubber system scrubbing liquid flow rate and pH of the scrubber blowdown using the continuous parameter monitoring system in accordance with the requirements outlined in 40 CFR 63.7740, 40 CFR 63.7741, 40 CFR 63.7742, and 40 CFR 63.7743.[2] **(R 336.1225, R 336.1702, R 336.1910, 40 CFR 63.7740, 40 CFR 63.7741, 40 CFR 63.7742, 40 CFR 63.7743)**

3. The permittee shall calculate the VOC emission rates from EU-LAEMPE#1AND#2-S2 for each 12 month rolling time period using a method acceptable to the AQD District Supervisor.[2] **(R 336.1702)**

4. The permittee shall keep, in a satisfactory manner, records to demonstrate continuous compliance with the applicable operation and maintenance requirements of 40 CFR Part 63, Subpart EEEEE. All records shall be kept on file and made available to the Department upon request.[2] **(40 CFR 63.7745, 40 CFR 63.7753)**

5. The permittee shall keep, in a satisfactory manner, all records required by 40 CFR 63.7752 to demonstrate compliance with 40 CFR Part 63, Subpart EEEEE. All records shall be kept on file and made available to the Department upon request.[2] **(40 CFR 63.7752, 40 CFR 63.7753)**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. The permittee shall submit all applicable notifications required in 40 CFR 63.8(e), 40 CFR 63.8(f)(4) and (6) for EU-LAEMPE#1AND#2-S2.[2] **(40 CFR 63.6, 40 CFR 63.7, 40 CFR 63.8, 40 CFR 63.9, 40 CFR 63.7750)**

5. The permittee shall submit semiannual compliance reports. The permittee shall submit all records to the AQD District Supervisor in an acceptable format, in accordance with 40 CFR 63.7751.[2] **(40 CFR 63.7746, 40 CFR 63.7751)**

See Appendix 8-S2

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SVLAEMPE#1	20[2]	52[2]	**R 336.1225, R 336.2803, R 336.2804, 40 CFR 52.21 (c) & (d)**
2. SVLAEMPE#2	20[2]	51[2]	**R 336.1225, R 336.2803, R 336.2804, 40 CFR 52.21 (c) & (d)**
3. SVLaempeOven1	26[2]	52[2]	**R 336.1225, R 336.2803, R 336.2804, 40 CFR 52.21 (c) & (d)**
4. SVLaempeOven2	11[2]	53[2]	**R 336.1225, R 336.2803, R 336.2804, 40 CFR 52.21 (c) & (d)**

IX. OTHER REQUIREMENT(S)

1. Within 30 days after the compliance date specified in 40 CFR 63.7683, the permittee shall demonstrate initial compliance with the applicable work practice standards outlined in 40 CFR 63.7700 and operation and maintenance requirements outlined in 40 CFR 63.7710.[2] **(40 CFR 63.7730(b), 40 CFR 63.7734, 40 CFR 63.7735, 40 CFR 63.7736)**

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

EU-MISCELLANEOUS-S2
EMISSION UNIT CONDITIONS

DESCRIPTION

Use of materials ancillary to the core making process including daub/mud, glue/paste, coating, core box release agent, and metal cleaners

Flexible Group ID: NA

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOC	7.0 tpy[2]	12-month rolling time period as determined at the end of each calendar month	EU-MISCELLANEOUS-S2	SC VI.1, VI.2, VI.3	**R 336.1702**

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall handle all VOC and/or HAP containing materials, including coatings, reducers, solvents and thinners, in a manner to minimize the generation of fugitive emissions. The permittee shall keep containers covered at all times except when operator access is necessary.[2] **(R 336.1205(3), R 336.1224, R 336.1225, R 336.1702(a))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall monitor and record, in a satisfactory manner, the VOC content of each material included in EU-MISCELLANEOUS-S2. A Material Safety Data Sheet or other manufacturer's certification acceptable to the District Supervisor is a satisfactory record.[2] **(R 336.1205(3), R 336.1225, R 336.1702(a))**

2. The permittee shall monitor and record, in a satisfactory manner, the usage rate in gallons on a monthly and 12-month rolling time period basis of each material included in EU-MISCELLANEOUS-S2.[2] **(R 336.1205, R 336.1225, R 336.1702)**

3. The permittee shall calculate and keep records of the VOC emission rate from EU-MISCELLANEOUS-S2 for each 12-month rolling time period using a method acceptable to the AQD District Supervisor.[2] **(R 336.1205, R 336.1225, R 336.1702)**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8-S2

VIII. STACK/VENT RESTRICTION(S)

NA

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1]This condition is state-only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

D. FLEXIBLE GROUP CONDITIONS

Part D outlines the terms and conditions that apply to more than one emission unit. The permittee is subject to the special conditions for each flexible group in addition to the General Conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply, NA (not applicable) has been used in the table. If there are no special conditions that apply to more than one emission unit, this section will be left blank.

E. NON-APPLICABLE REQUIREMENTS

At the time of the ROP issuance, the AQD has determined that no non-applicable requirements have been identified for incorporation into the permit shield provision set forth in the General Conditions in Part A pursuant to Rule 213(6)(a)(ii).

APPENDICES

Appendix 1-S2. Abbreviations and Acronyms

The following is an alphabetical listing of abbreviations/acronyms that may be used in this permit.

AQD	Air Quality Division	MM	Million
acfm	Actual cubic feet per minute	MSDS	Material Safety Data Sheet
BACT	Best Available Control Technology	MW	Megawatts
BTU	British Thermal Unit	NA	Not Applicable
°C	Degrees Celsius	NAAQS	National Ambient Air Quality Standards
CAA	Federal Clean Air Act	NESHAP	National Emission Standard for Hazardous Air Pollutants
CAM	Compliance Assurance Monitoring	NMOC	Non-methane Organic Compounds
CEM	Continuous Emission Monitoring	NOx	Oxides of Nitrogen
CFR	Code of Federal Regulations	NSPS	New Source Performance Standards
CO	Carbon Monoxide	NSR	New Source Review
COM	Continuous Opacity Monitoring	PM	Particulate Matter
department	Michigan Department of Environmental Quality	PM-10	Particulate Matter less than 10 microns in diameter
dscf	Dry standard cubic foot	pph	Pound per hour
dscm	Dry standard cubic meter	ppm	Parts per million
EPA	United States Environmental Protection Agency	ppmv	Parts per million by volume
EU	Emission Unit	ppmw	Parts per million by weight
°F	Degrees Fahrenheit	PS	Performance Specification
FG	Flexible Group	PSD	Prevention of Significant Deterioration
GACS	Gallon of Applied Coating Solids	psia	Pounds per square inch absolute
GC	General Condition	psig	Pounds per square inch gauge
gr	Grains	PeTE	Permanent Total Enclosure
HAP	Hazardous Air Pollutant	PTI	Permit to Install
Hg	Mercury	RACT	Reasonable Available Control Technology
hr	Hour	ROP	Renewable Operating Permit
HP	Horsepower	SC	Special Condition
H_2S	Hydrogen Sulfide	scf	Standard cubic feet
HVLP	High Volume Low Pressure *	sec	Seconds
ID	Identification (Number)	SCR	Selective Catalytic Reduction
IRSL	Initial Risk Screening Level	SO_2	Sulfur Dioxide
ITSL	Initial Threshold Screening Level	SRN	State Registration Number
LAER	Lowest Achievable Emission Rate	TAC	Toxic Air Contaminant
lb	Pound	Temp	Temperature
m	Meter	THC	Total Hydrocarbons
MACT	Maximum Achievable Control Technology	tpy	Tons per year
MAERS	Michigan Air Emissions Reporting System	µg	Microgram
MAP	Malfunction Abatement Plan	VE	Visible Emissions
MDEQ	Michigan Department of Environmental Quality	VOC	Volatile Organic Compounds
mg	Milligram	yr	Year
mm	Millimeter		

*For HVLP applicators, the pressure measured at the gun air cap shall not exceed 10 pounds per square inch gauge (psig).

Appendix 2-S2. Schedule of Compliance

The permittee certified in the ROP application that this stationary source is in compliance with all applicable requirements and the permittee shall continue to comply with all terms and conditions of this ROP. A Schedule of Compliance is not required. **(R 336.1213(4)(a), R 336.1119(a)(ii))**

Appendix 3-S2. Monitoring Requirements

Specific monitoring requirement procedures, methods or specifications are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 4-S2. Recordkeeping

Specific recordkeeping requirement formats and procedures are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 5-S2. Testing Procedures

Specific testing requirement plans, procedures, and averaging times are detailed in the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 6-S2. Permits to Install

The following table lists any PTI and/or Permit to Operate (PTO) that relate to the identified emission units or flexible groups as of the effective date of this ROP. This includes all PTIs and/or PTOs that are hereby incorporated into Source-Wide PTI No. MI-PTI-N5814-2015. The PTIs issued after the effective date of this ROP, including amendments or modifications, will be identified in Appendix 6 upon renewal.

Permit to Install Number	Description of Equipment	Corresponding Emission Unit(s) or Flexible Group(s)
162-11A	Incorporate several changes to existing PTI No. 162-11, including administrative changes, removal of equipment, and incorporation of conditions related to 40 CFR, Part 63, Subparts A and EEEEE.	EU-SHELLCORE-S2, EU-SILOS-S2, EU-LAEMPE#1AND#2-S2, EU-MISCELLANEOUS-S2

Appendix 7-S2. Emission Calculations

Specific emission calculations to be used with monitoring, testing or recordkeeping data are detailed in the appropriate Source-Wide, Emission Unit and/or Flexible group Special Conditions. Therefore, this appendix is not applicable.

Appendix 8-S2. Reporting

A. Annual, Semiannual, and Deviation Certification Reporting

The permittee shall use the MDEQ, AQD, Report Certification form (EQP 5736) and MDEQ, AQD, Deviation Report form (EQP 5737) for the annual, semiannual and deviation certification reporting referenced in the Reporting Section of the Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Alternative formats must meet the provisions of Rule 213(4)(c) and Rule 213(3)(c)(i), respectively, and be approved by the AQD District Supervisor.

B. Other Reporting

Specific reporting requirement formats and procedures are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, Part B of this appendix is not applicable.

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

EFFECTIVE DATE: July 8, 2015

ISSUED TO

BREMBO NORTH AMERICA, INC.

State Registration Number (SRN): N6226

LOCATED AT

29991 M-60 East, Homer, Michigan 49245

RENEWABLE OPERATING PERMIT

Permit Number: MI-ROP-N6226-2015

Expiration Date: July 8, 2020

Administratively Complete ROP Renewal Application Due Between
January 8, 2019 and January 8, 2020

This Renewable Operating Permit (ROP) is issued in accordance with and subject to Section 5506(3) of Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451). Pursuant to Michigan Air Pollution Control Rule 210(1), this ROP constitutes the permittee's authority to operate the stationary source identified above in accordance with the general conditions, special conditions and attachments contained herein. Operation of the stationary source and all emission units listed in the permit are subject to all applicable future or amended rules and regulations pursuant to Act 451 and the federal Clean Air Act.

SOURCE-WIDE PERMIT TO INSTALL

Permit Number: MI-PTI-N6226-2015

This Permit to Install (PTI) is issued in accordance with and subject to Section 5505(5) of Act 451. Pursuant to Michigan Air Pollution Control Rule 214a, the terms and conditions herein, identified by the underlying applicable requirement citation of Rule 201(1)(a), constitute a federally enforceable PTI. The PTI terms and conditions do not expire and remain in effect unless the criteria of Rule 201(6) are met. Operation of all emission units identified in the PTI is subject to all applicable future or amended rules and regulations pursuant to Act 451 and the federal Clean Air Act.

Michigan Department of Environmental Quality

Mary A. Douglas, Kalamazoo District Supervisor

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AUTHORITY AND ENFORCEABILITY

For the purpose of this permit, the **permittee** is defined as any person who owns or operates an emission unit at a stationary source for which this permit has been issued. The **department** is defined in Rule 104(d) as the Director of the Michigan Department of Environmental Quality (MDEQ) or his or her designee.

The permittee shall comply with all specific details in the permit terms and conditions and the cited underlying applicable requirements. All terms and conditions in this ROP are both federally enforceable and state enforceable unless otherwise footnoted. Certain terms and conditions are applicable to most stationary sources for which an ROP has been issued. These general conditions are included in Part A of this ROP. Other terms and conditions may apply to a specific emission unit, several emission units which are represented as a flexible group, or the entire stationary source which is represented as a Source-Wide group. Special conditions are identified in Parts B, C, D and/or the appendices.

In accordance with Rule 213(2)(a), all underlying applicable requirements are identified for each ROP term or condition. All terms and conditions that are included in a PTI, are streamlined, subsumed and/or are state-only enforceable will be noted as such.

In accordance with Section 5507 of Act 451, the permittee has included in the ROP application a compliance certification, a schedule of compliance, and a compliance plan. For applicable requirements with which the source is in compliance, the source will continue to comply with these requirements. For applicable requirements with which the source is not in compliance, the source will comply with the detailed schedule of compliance requirements that are incorporated as an appendix in this ROP. Furthermore, for any applicable requirements effective after the date of issuance of this ROP, the stationary source will meet the requirements on a timely basis, unless the underlying applicable requirement requires a more detailed schedule of compliance.

Issuance of this permit does not obviate the necessity of obtaining such permits or approvals from other units of government as required by law.

A. GENERAL CONDITIONS

Permit Enforceability

- All conditions in this permit are both federally enforceable and state enforceable unless otherwise noted. **(R 336.1213(5))**

- Those conditions that are hereby incorporated in a state-only enforceable Source-Wide PTI pursuant to Rule 201(2)(d) are designated by footnote one. **(R 336.1213(5)(a), R 336.1214a(5))**

- Those conditions that are hereby incorporated in a federally enforceable Source-Wide PTI pursuant to Rule 201(2)(c) are designated by footnote two. **(R 336.1213(5)(b), R 336.1214a(3))**

General Provisions

1. The permittee shall comply with all conditions of this ROP. Any ROP noncompliance constitutes a violation of Act 451, and is grounds for enforcement action, for ROP revocation or revision, or for denial of the renewal of the ROP. All terms and conditions of this ROP that are designated as federally enforceable are enforceable by the Administrator of the United States Environmental Protection Agency (USEPA) and by citizens under the provisions of the federal Clean Air Act (CAA). Any terms and conditions based on applicable requirements which are designated as "state-only" are not enforceable by the USEPA or citizens pursuant to the CAA. **(R 336.1213(1)(a))**

2. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this ROP. **(R 336.1213(1)(b))**

3. This ROP may be modified, revised, or revoked for cause. The filing of a request by the permittee for a permit modification, revision, or termination, or a notification of planned changes or anticipated noncompliance does not stay any ROP term or condition. This does not supersede or affect the ability of the permittee to make changes, at the permittee's own risk, pursuant to Rule 215 and Rule 216. **(R 336.1213(1)(c))**

4. The permittee shall allow the department, or an authorized representative of the department, upon presentation of credentials and other documents as may be required by law and upon stating the authority for and purpose of the investigation, to perform any of the following activities **(R 336.1213(1)(d))**:
   a. Enter, at reasonable times, a stationary source or other premises where emissions-related activity is conducted or where records must be kept under the conditions of the ROP.
   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the ROP.
   c. Inspect, at reasonable times, any of the following:
      i. Any stationary source.
      ii. Any emission unit.
      iii. Any equipment, including monitoring and air pollution control equipment.
      iv. Any work practices or operations regulated or required under the ROP.
   d. As authorized by Section 5526 of Act 451, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the ROP or applicable requirements.

5. The permittee shall furnish to the department, within a reasonable time, any information the department may request, in writing, to determine whether cause exists for modifying, revising, or revoking the ROP or to determine compliance with this ROP. Upon request, the permittee shall also furnish to the department copies of any records that are required to be kept as a term or condition of this ROP. For information which is claimed by the permittee to be confidential, consistent with the requirements of the 1976 PA 442, MCL §15.231 et seq., and known as the Freedom of Information Act, the person may also be required to furnish the records directly to the USEPA together with a claim of confidentiality. **(R 336.1213(1)(e))**

6. A challenge by any person, the Administrator of the USEPA, or the department to a particular condition or a part of this ROP shall not set aside, delay, stay, or in any way affect the applicability or enforceability of any other condition or part of this ROP. **(R 336.1213(1)(f))**

7. The permittee shall pay fees consistent with the fee schedule and requirements pursuant to Section 5522 of Act 451. **(R 336.1213(1)(g))**

8. This ROP does not convey any property rights or any exclusive privilege. **(R 336.1213(1)(h))**

Equipment & Design

9. Any collected air contaminants shall be removed as necessary to maintain the equipment at the required operating efficiency. The collection and disposal of air contaminants shall be performed in a manner so as to minimize the introduction of contaminants to the outer air. Transport of collected air contaminants in Priority I and II areas requires the use of material handling methods specified in Rule 370(2).[2] **(R 336.1370)**

10. Any air cleaning device shall be installed, maintained, and operated in a satisfactory manner and in accordance with the Michigan Air Pollution Control rules and existing law. **(R 336.1910)**

Emission Limits

11. Unless otherwise specified in this ROP, the permittee shall comply with Rule 301, which states, in part, "Except as provided in subrules 2, 3, and 4 of this rule, a person shall not cause or permit to be discharged into the outer air from a process or process equipment a visible emission of a density greater than the most stringent of the following":[2] **(R 336.1301(1))**:
    a. A 6-minute average of 20 percent opacity, except for one 6-minute average per hour of not more than 27 percent opacity.
    b. A limit specified by an applicable federal new source performance standard.

    The grading of visible emissions shall be determined in accordance with Rule 303.

12. The permittee shall not cause or permit the emission of an air contaminant or water vapor in quantities that cause, alone or in reaction with other air contaminants, either of the following:
    a. Injurious effects to human health or safety, animal life, plant life of significant economic value, or property.[1] **(R 336.1901(a))**
    b. Unreasonable interference with the comfortable enjoyment of life and property.[1] **(R 336.1901(b))**

Testing/Sampling

13. The department may require the owner or operator of any source of an air contaminant to conduct acceptable performance tests, at the owner's or operator's expense, in accordance with Rule 1001 and Rule 1003, under any of the conditions listed in Rule 1001(1).[2] **(R 336.2001)**

14. Any required performance testing shall be conducted in accordance with Rule 1001(2), Rule 1001(3) and Rule 1003. **(R 336.2001(2), R 336.2001(3), R 336.2003(1))**

15. Any required test results shall be submitted to the Air Quality Division (AQD) in the format prescribed by the applicable reference test method within 60 days following the last date of the test. **(R 336.2001(5))**

Monitoring/Recordkeeping

16. Records of any periodic emission or parametric monitoring required in this ROP shall include the following information specified in Rule 213(3)(b)(i), where appropriate **(R 336.1213(3)(b))**:
    a. The date, location, time, and method of sampling or measurements.
    b. The dates the analyses of the samples were performed.
    c. The company or entity that performed the analyses of the samples.

d. The analytical techniques or methods used.
e. The results of the analyses.
f. The related process operating conditions or parameters that existed at the time of sampling or measurement.

17. All required monitoring data, support information and all reports, including reports of all instances of deviation from permit requirements, shall be kept and furnished to the department upon request for a period of not less than 5 years from the date of the monitoring sample, measurement, report or application. Support information includes all calibration and maintenance records and all original strip-chart recordings, or other original data records, for continuous monitoring instrumentation and copies of all reports required by the ROP. **(R 336.1213(1)(e), R 336.1213(3)(b)(ii))**

Certification & Reporting

18. Except for the alternate certification schedule provided in Rule 213(3)(c)(iii)(B), any document required to be submitted to the department as a term or condition of this ROP shall contain an original certification by a Responsible Official which states that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete. **(R 336.1213(3)(c))**

19. A Responsible Official shall certify to the appropriate AQD District Office and to the USEPA that the stationary source is and has been in compliance with all terms and conditions contained in the ROP except for deviations that have been or are being reported to the appropriate AQD District Office pursuant to Rule 213(3)(c). This certification shall include all the information specified in Rule 213(4)(c)(i) through (v) and shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the certification are true, accurate, and complete. The USEPA address is: USEPA, Air Compliance Data - Michigan, Air and Radiation Division, 77 West Jackson Boulevard, Chicago, Illinois 60604. **(R 336.1213(4)(c))**

20. The certification of compliance shall be submitted annually for the term of this ROP as detailed in the special conditions, or more frequently if specified in an applicable requirement or in this ROP. **(R 336.1213(4)(c))**

21. The permittee shall promptly report any deviations from ROP requirements and certify the reports. The prompt reporting of deviations from ROP requirements is defined in Rule 213(3)(c)(ii) as follows, unless otherwise described in this ROP **(R 336.1213(3)(c))**:
    a. For deviations that exceed the emissions allowed under the ROP, prompt reporting means reporting consistent with the requirements of Rule 912 as detailed in Condition 25. All reports submitted pursuant to this paragraph shall be promptly certified as specified in Rule 213(3)(c)(iii).
    b. For deviations which exceed the emissions allowed under the ROP and which are not reported pursuant to Rule 912 due to the duration of the deviation, prompt reporting means the reporting of all deviations in the semiannual reports required by Rule 213(3)(c)(i). The report shall describe reasons for each deviation and the actions taken to minimize or correct each deviation.
    c. For deviations that do not exceed the emissions allowed under the ROP, prompt reporting means the reporting of all deviations in the semiannual reports required by Rule 213(3)(c)(i). The report shall describe the reasons for each deviation and the actions taken to minimize or correct each deviation.

22. For reports required pursuant to Rule 213(3)(c)(ii), prompt certification of the reports is described in Rule 213(3)(c)(iii) as either of the following **(R 336.1213(3)(c))**:
    a. Submitting a certification by a Responsible Official with each report which states that, based on information and belief formed after reasonable inquiry, the statements and information in the report are true, accurate, and complete.
    b. Submitting, within 30 days following the end of a calendar month during which one or more prompt reports of deviations from the emissions allowed under the ROP were submitted to the department pursuant to Rule 213(3)(c)(ii), a certification by a Responsible Official which states that, “based on information and belief formed after reasonable inquiry, the statements and information contained in each of the reports submitted during the previous month were true, accurate, and complete”. The certification shall include a listing of the reports that are being certified. Any report submitted pursuant to Rule 213(3)(c)(ii) that will be certified on a monthly basis pursuant to this paragraph shall include a statement that certification of the report will be provided within 30 days following the end of the calendar month.

23. Semiannually for the term of the ROP as detailed in the special conditions, or more frequently if specified, the permittee shall submit certified reports of any required monitoring to the appropriate AQD District Office. All instances of deviations from ROP requirements during the reporting period shall be clearly identified in the reports. **(R 336.1213(3)(c)(i))**

24. On an annual basis, the permittee shall report the actual emissions, or the information necessary to determine the actual emissions, of each regulated air pollutant as defined in Rule 212(6) for each emission unit utilizing the emissions inventory forms provided by the department. **(R 336.1212(6))**

25. The permittee shall provide notice of an abnormal condition, start-up, shutdown, or malfunction that results in emissions of a hazardous or toxic air pollutant which continue for more than one hour in excess of any applicable standard or limitation, or emissions of any air contaminant continuing for more than two hours in excess of an applicable standard or limitation, as required in Rule 912, to the appropriate AQD District Office. The notice shall be provided not later than two business days after the start-up, shutdown, or discovery of the abnormal conditions or malfunction. Notice shall be by any reasonable means, including electronic, telephonic, or oral communication. Written reports, if required under Rule 912, must be submitted to the appropriate AQD District Supervisor within 10 days after the start-up or shutdown occurred, within 10 days after the abnormal conditions or malfunction has been corrected, or within 30 days of discovery of the abnormal conditions or malfunction, whichever is first. The written reports shall include all of the information required in Rule 912(5) and shall be certified by a Responsible Official in a manner consistent with the CAA.[2] **(R 336.1912)**

Permit Shield

26. Compliance with the conditions of the ROP shall be considered compliance with any applicable requirements as of the date of ROP issuance, if either of the following provisions is satisfied **(R 336.1213(6)(a)(i), R 336.1213(6)(a)(ii))**:
    a. The applicable requirements are included and are specifically identified in the ROP.
    b. The permit includes a determination or concise summary of the determination by the department that other specifically identified requirements are not applicable to the stationary source.

    Any requirements identified in Part E of this ROP have been identified as non-applicable to this ROP and are included in the permit shield.

27. Nothing in this ROP shall alter or affect any of the following:
    a. The provisions of Section 303 of the CAA, emergency orders, including the authority of the USEPA under Section 303 of the CAA. **(R 336.1213(6)(b)(i))**
    b. The liability of the owner or operator of this source for any violation of applicable requirements prior to or at the time of this ROP issuance. **(R 336.1213(6)(b)(ii))**
    c. The applicable requirements of the acid rain program, consistent with Section 408(a) of the CAA. **(R 336.1213(6)(b)(iii))**
    d. The ability of the USEPA to obtain information from a source pursuant to Section 114 of the CAA. **(R 336.1213(6)(b)(iv))**

28. The permit shield shall not apply to provisions incorporated into this ROP through procedures for any of the following:
    a. Operational flexibility changes made pursuant to Rule 215. **(R 336.1215(5))**
    b. Administrative Amendments made pursuant to Rule 216(1)(a)(i)-(iv). **(R 336.1216(1)(b)(iii))**
    c. Administrative Amendments made pursuant to Rule 216(1)(a)(v) until the amendment has been approved by the department. **(R 336.1216(1)(c)(iii))**
    d. Minor Permit Modifications made pursuant to Rule 216(2). **(R 336.1216(2)(f))**
    e. State-Only Modifications made pursuant to Rule 216(4) until the changes have been approved by the department. **(R 336.1216(4)(e))**

29. Expiration of this ROP results in the loss of the permit shield. If a timely and administratively complete application for renewal is submitted not more than 18 months, but not less than 6 months, before the expiration date of the ROP, but the department fails to take final action before the end of the ROP term, the existing ROP

does not expire until the renewal is issued or denied, and the permit shield shall extend beyond the original ROP term until the department takes final action. **(R 336.1217(1)(c), R 336.1217(1)(a))**

Revisions

30. For changes to any process or process equipment covered by this ROP that do not require a revision of the ROP pursuant to Rule 216, the permittee must comply with Rule 215. **(R 336.1215, R 336.1216)**

31. A change in ownership or operational control of a stationary source covered by this ROP shall be made pursuant to Rule 216(1). **(R 336.1219(2))**

32. For revisions to this ROP, an administratively complete application shall be considered timely if it is received by the department in accordance with the time frames specified in Rule 216. **(R 336.1210(10))**

33. Pursuant to Rule 216(1)(b)(iii), Rule 216(2)(d) and Rule 216(4)(d), after a change has been made, and until the department takes final action, the permittee shall comply with both the applicable requirements governing the change and the ROP terms and conditions proposed in the application for the modification. During this time period, the permittee may choose to not comply with the existing ROP terms and conditions that the application seeks to change. However, if the permittee fails to comply with the ROP terms and conditions proposed in the application during this time period, the terms and conditions in the ROP are enforceable. **(R 336.1216(1)(c)(iii), R 336.1216(2)(d), R 336.1216(4)(d))**

Reopenings

34. A ROP shall be reopened by the department prior to the expiration date and revised by the department under any of the following circumstances:
    a. If additional requirements become applicable to this stationary source with three or more years remaining in the term of the ROP, but not if the effective date of the new applicable requirement is later than the ROP expiration date. **(R 336.1217(2)(a)(i))**
    b. If additional requirements pursuant to Title IV of the CAA become applicable to this stationary source. **(R 336.1217(2)(a)(ii))**
    c. If the department determines that the ROP contains a material mistake, information required by any applicable requirement was omitted, or inaccurate statements were made in establishing emission limits or the terms or conditions of the ROP. **(R 336.1217(2)(a)(iii))**
    d. If the department determines that the ROP must be revised to ensure compliance with the applicable requirements. **(R 336.1217(2)(a)(iv))**

Renewals

35. For renewal of this ROP, an administratively complete application shall be considered timely if it is received by the department not more than 18 months, but not less than 6 months, before the expiration date of the ROP. **(R 336.1210(8))**

Stratospheric Ozone Protection

36. If the permittee is subject to Title 40 of the CFR Part 82 and services, maintains, or repairs appliances except for motor vehicle air conditioners (MVAC), or disposes of appliances containing refrigerant, including MVAC and small appliances, or if the permittee is a refrigerant reclaimer, appliance owner or a manufacturer of appliances or recycling and recovery equipment, the permittee shall comply with all applicable standards for recycling and emissions reduction pursuant to 40 CFR Part 82Subpart F.

37. If the permittee is subject to 40 CFR Part 82, and performs a service on motor (fleet) vehicles when this service involves refrigerant in the MVAC, the permittee is subject to all the applicable requirements as specified in 40 CFR Part 82, Subpart B, Servicing of Motor Vehicle Air Conditioners. The term “motor vehicle” as used in Subpart B does not include a vehicle in which final assembly of the vehicle has not been completed by the original equipment manufacturer. The term MVAC as used in Subpart B does not include the air-tight sealed

refrigeration system used for refrigerated cargo or an air conditioning system on passenger buses using Hydrochlorofluorocarbon-22 refrigerant.

Risk Management Plan

38. If subject to Section 112(r) of the CAA and 40 CFR Part 68, the permittee shall register and submit to the USEPA the required data related to the risk management plan for reducing the probability of accidental releases of any regulated substances listed pursuant to Section 112(r)(3) of the CAA as amended in 40 CFR Part 68.130. The list of substances, threshold quantities, and accident prevention regulations promulgated under 40 CFR Part 68, do not limit in any way the general duty provisions under Section 112(r)(1).

39. If subject to Section 112(r) of the CAA and 40 CFR Part 68, the permittee shall comply with the requirements of 40 CFR Part 68, no later than the latest of the following dates as provided in 40 CFR 68.10(a):
    a. June 21, 1999,
    b. Three years after the date on which a regulated substance is first listed under 40 CFR 68.130, or
    c. The date on which a regulated substance is first present above a threshold quantity in a process.

40. If subject to Section 112(r) of the CAA and 40 CFR Part 68, the permittee shall submit any additional relevant information requested by any regulatory agency necessary to ensure compliance with the requirements of 40 CFR Part 68.

41. If subject to Section 112(r) of the CAA and 40 CFR Part 68, the permittee shall annually certify compliance with all applicable requirements of Section 112(r) as detailed in Rule 213(4)(c)). **(40 CFR Part 68)**

Emission Trading

42. Emission averaging and emission reduction credit trading are allowed pursuant to any applicable interstate or regional emission trading program that has been approved by the Administrator of the USEPA as a part of Michigan's State Implementation Plan. Such activities must comply with Rule 215 and Rule 216. **(R 336.1213(12))**

Permit To Install (PTI)

43. The process or process equipment included in this permit shall not be reconstructed, relocated, or modified unless a PTI authorizing such action is issued by the department, except to the extent such action is exempt from the PTI requirements by any applicable rule.[2] **(R 336.1201(1))**

44. The department may, after notice and opportunity for a hearing, revoke PTI terms or conditions if evidence indicates the process or process equipment is not performing in accordance with the terms and conditions of the PTI or is violating the department's rules or the CAA.[2] **(R 336.1201(8) Section 5510 of Act 451))**

45. The terms and conditions of a PTI shall apply to any person or legal entity that now or hereafter owns or operates the process or process equipment at the location authorized by the PTI. If a new owner or operator submits a written request to the department pursuant to Rule 219 and the department approves the request, this PTI will be amended to reflect the change of ownership or operational control. The request must include all of the information required by Subrules (1)(a), (b) and (c) of Rule 219. The written request shall be sent to the appropriate AQD District Supervisor, MDEQ.[2] **(R 336.1219)**

46. If the installation, reconstruction, relocation, or modification of the equipment for which PTI terms and conditions have been approved has not commenced within 18 months of the original PTI issuance date, or has been interrupted for 18 months, the applicable terms and conditions from that PTI, as incorporated into the ROP, shall become void unless otherwise authorized by the department. Furthermore, the person to whom that PTI was issued, or the designated authorized agent, shall notify the department via the Supervisor, Permit Section, MDEQ, AQD, P.O. Box 30260, Lansing, Michigan 48909, if it is decided not to pursue the installation, reconstruction, relocation, or modification of the equipment allowed by the terms and conditions from that PTI.[2] **(R 336.1201(4))**

Footnotes:

[1]This condition is state-only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

B. SOURCE-WIDE CONDITIONS

Part B outlines the Source-Wide Terms and Conditions that apply to this stationary source. The permittee is subject to these special conditions for the stationary source in addition to the general conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply to this source, NA (not applicable) has been used in the table. If there are no Source-Wide Conditions, this section will be left blank.

C. EMISSION UNIT CONDITIONS

Part C outlines terms and conditions that are specific to individual emission units listed in the Emission Unit Summary Table. The permittee is subject to the special conditions for each emission unit in addition to the General Conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply, NA (not applicable) has been used in the table. If there are no conditions specific to individual emission units, this section will be left blank.

EMISSION UNIT SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EU-GeoMet-01	The HVLP spray guns apply the coating to multiple surfaces of automotive brake products. One paint booth applies paint product to the surfaces. Brake rotors or drums are heated using an oven after the coating has been applied. Associated flash-off areas/drying area allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	09-01-09	FG-GeoMet FG-MISCMETAL FG-MACT MMMM
EU-GeoMet-02	The HVLP spray guns apply the coating to multiple surfaces of automotive brake products. One paint booth applies paint product to the surfaces. Brake rotors or drums are heated using an oven after the coating has been applied. Associated flash-off areas/drying area allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	11-01-11	FG-GeoMet FG-MISCMETAL FG-MACT MMMM
EU-Black (Sprimag Black)	Brake rotors or drums are pre-heated using a single induction unit and HVLP spray guns apply the coating to multiple surfaces of automotive brake products. Coating line applies coating to several surfaces on brake rotors and brake drums. A paint booth applies paint product to the surfaces and associated flash-off area/drying area that allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	09-01-01	FG-Magni&Black FG-MACT MMMM

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EU-Zinc-01	Brake rotors or drums are pre-heated using a single induction unit and HVLP spray guns apply the coating to multiple surfaces of automotive brake products. The coating line applies coating to several surfaces on brake rotors and brake drums. A paint booth applies paint product to the surfaces and associated flash-off area/drying area that allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	02-01-01	FG-Zinc FG-MACT MMMM
EU-Zinc-02 (Sprimag Zinc)	The HVLP spray guns apply the coating to multiple surfaces of automotive brake products. A paint booth applies paint product to the surfaces. Brake rotors or drums are heated using an oven after the coating has been applied. Associated flash-off areas/drying area allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	07-01-06	FG-Zinc FG-MACT MMMM
EU-Zinc-03 (Brentro 01)	Brake rotors or drums are pre-heated using an oven and HVLP spray guns apply the coating to multiple surfaces of automotive brake products. The coating line applies coating to several surfaces on brake rotors and brake drums. A paint booth applies paint product to the surfaces and associated flash-off area/drying area that allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	07-01-06	FG-Zinc FG-MACT MMMM
EU-Zinc-04 (Brentro 02)	Brake rotors or drums are pre-heated using an oven and HVLP spray guns apply the coating to multiple surfaces of automotive brake products. The coating line applies coating to several surfaces on brake rotors and brake drums. A paint booth applies paint product to the surfaces and associated flash-off area/drying area that allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	05-01-09	FG-Zinc FG-MACT MMMM
EU-Zinc-05-Blechtopf	Brake rotors or drums are pre-heated and dried following coating application, using electric induction heaters. The coating application is done in a spray booth using robotic HVLP spray applicators to apply coatings to multiple surfaces of automotive brake products. The spray booth will be equipped with dry filters to collect any overspray.	12-18-13	FG-Zinc FG-MACT MMMM

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EU-Magni-01	Brake rotors or drums are pre-heated using an oven and HVLP spray guns apply the coating to multiple surfaces of automotive brake products. The coating line applies coating to several surfaces on brake rotors and brake drums. A paint booth applies paint product to the surfaces and associated flash-off area/drying area that allow the brake products to dry or cure. Dry filters are used to collect any overspray from the coating process.	05-01-10	FG-Magni&Black FG-MACT MMMM
EU-Magni-02	Brake rotors or drums are pre-heated using an oven and HVLP spray guns apply the coating to multiple surfaces of automotive brake products. The coating line applies coating to several surfaces on brake rotors and brake drums. A paint booth applies paint product to the surfaces and associated flash-off area/drying area that allow the brake products to dry or cure. Dry filters are used to collect any over spray from the coating process.	08-01-11	FG-Magni&Black FG-MACT MMMM
EU-Magni-03	Brake rotors or drums are pre-heated and dried following coating application, using electric induction heaters. The coating application is done in a spray booth using robotic HVLP spray applicators to apply coatings to multiple surfaces of automotive brake products. The spray booth will be equipped with dry filters to collect any overspray.	11-20-13	FG-Magni&Black FG-MACT MMMM
EU-Magni-04	Brake rotors or drums are pre-heated and dried following coating application, using electric induction heaters. The coating application is done in a spray booth using robotic HVLP spray applicators to apply coatings to multiple surfaces of automotive brake products. The spray booth will be equipped with dry filters to collect any overspray.	12-18-13	FG-Magni&Black FG-MACT MMMM
EU-Magni-05	Brake rotors or drums are pre-heated and dried following coating application, using electric induction heaters. The coating application is done in a spray booth using robotic HVLP spray applicators to apply coatings to multiple surfaces of automotive brake products. The spray booth will be equipped with dry filters to collect any overspray.	04-01-14	FG-Magni&Black FG-MACT MMMM

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date/ Modification Date	Flexible Group ID
EU-COLDCLEANERS	Any cold cleaner that is grandfathered or exempt from Rule 201 pursuant to Rule 281(h), or Rule 285(r)(iv). Existing cold cleaners were placed into operation prior to July 1, 1979. New cold cleaners were placed into operation on or after July 1, 1979.	02-01-01	FG-COLDCLEANERS

D. FLEXIBLE GROUP CONDITIONS

Part D outlines the terms and conditions that apply to more than one emission unit. The permittee is subject to the special conditions for each flexible group in addition to the General Conditions in Part A and any other terms and conditions contained in this ROP.

The permittee shall comply with all specific details in the special conditions and the underlying applicable requirements cited. If a specific condition type does not apply, NA (not applicable) has been used in the table. If there are no special conditions that apply to more than one emission unit, this section will be left blank.

FLEXIBLE GROUP SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FG-GeoMet	Two automotive metal surface coating lines.	EU-GeoMet-01 EU-GeoMet-02
FG-Magni&Black	Six automotive metal surface coating lines.	EU-Black EU-Magni-01 EU-Magni-02 EU-Magni-03 EU-Magni-04 EU-Magni-05
FG-Zinc	Five automotive metal surface coating lines.	EU-Zinc-01 EU-Zinc-02 EU-Zinc-03 EU-Zinc-04 EU-Zinc-05-Blechtopf
FG-MISCMETAL	All metal parts coating lines operating per the requirements of R 336.1621(10)(b), including equipment covered by other permits and exempt equipment.	EU-GeoMet-01 EU-GeoMet-02
FG-MACT MMMM	Each new, reconstructed, and existing affected source described in 40 CFR 63.3881(a)(1), including the subcategories listed in 40 CFR, Part 63, Subpart MMMM, 63.3881(a)(2) through (6), meeting the applicability requirements of 40 CFR 63.3881(b), which is engaged in the surface coating of miscellaneous metal parts and products. The affected source includes the collection of all the items listed in 40 CFR 63.3882(b)(1) through (4). Surface coating is defined by 40 CFR 63.3881 as the application of coating to a substrate using, for example, spray guns or dip tanks. Surface coating also includes associated activities, such as surface preparation, cleaning, mixing, and storage if they are directly related to the application of the coating. The 40 CFR, Part 63, Subpart MMMM, does not apply to surface coating or a coating operation that meets any of the criteria of 40 CFR 63.3881(c)(1) through (17).	EU-GeoMet-01 EU-GeoMet-02 EU-Black EU-Magni-01 EU-Magni-02 EU-Magni-03 EU-Magni-04 EU-Magni-05 EU-Zinc-01 EU-Zinc-02 EU-Zinc-03 EU-Zinc-04 EU-Zinc-05-Blechtopf

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FG-COLDCLEANERS	Any cold cleaner that is grandfathered or exempt from Rule 201 pursuant to Rule 281(h), or Rule 285(r)(iv). Existing cold cleaners were placed into operation prior to July 1, 1979. New cold cleaners were placed into operation on or after July 1, 1979.	EU-COLDCLEANERS

FG-GeoMet
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Two automotive metal surface coating lines.

Emission Units: EU-GeoMet-01, EU-GeoMet-02

POLLUTION CONTROL EQUIPMENT

Dry filters are used to collect any overspray from the coating process.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOCs	2,000 pounds per month[2]	Calendar month	Each EU of FG-GeoMet	SC VI.1 through SC VI.3	**R 336.1702(d)**
2. VOCs	9.7 tpy[2]	12-month rolling time period as determined at the end of each calendar month	FG-GeoMet	SC VI.1 through SC VI.3	**R 336.1702(d)**

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall capture all waste coatings, cleanup and purge solvents (materials) and shall store them in closed containers. The permittee shall dispose of all waste materials in an acceptable manner in compliance with all applicable state rules and federal regulations.[2] **(R 336.1702(a))**

2. The permittee shall dispose of spent filters in a manner which minimizes the introduction of air contaminants to the outer air.[2] **(R 336.1224, R 336.1370)**

3. The permittee shall handle all VOC and / or HAP containing materials, including coatings, reducers, solvents and thinners, in a manner to minimize the generation of fugitive emissions. The permittee shall keep containers covered at all times except when operator access is necessary.[2] **(R 336.1205, R 336.1225, R 336.1702(a))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate FG-GeoMet unless all respective exhaust filters are installed, maintained and operated in a satisfactory manner.[2] **(R 336.1224, R 336.1301, R 336.1910)**

2. The permittee shall equip and maintain FG-GeoMet with HVLP applicators or comparable technology with equivalent transfer efficiency. For HVLP applicators, the permittee shall keep test caps available for pressure testing.[2] **(R 336.1702(a))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall determine the VOC content, water content and density of any coating, as applied and as received, using federal Reference Test Method 24. Upon prior written approval by the AQD District Supervisor, the permittee may determine the VOC content from manufacturer's formulation data. If the Method 24 and the formulation values should differ, the permittee shall use the Method 24 results to determine compliance.[2] **(R 336.1702, R 336.2001, R 336.2003, R 336.2004, R 336.2040(5))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the 15th day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition.[2] **(R 336.1225, R 336.1702)**

2. The permittee shall maintain a current listing from the manufacturer of the chemical composition of each coating, cleanup and purge solvents, including the weight percent of each component. The data may consist of Material Safety Data Sheets, manufacturer's formulation data, or both as deemed acceptable by the AQD District Supervisor. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1225, R 336.1702)**

3. The permittee shall keep the following information on a calendar day basis for FG-GeoMet:
   a. Gallons (with water) of each coating, cleanup and purge solvents (material) used and reclaimed.
   b. VOC content (with water) of each material as applied.
   c. VOC mass emission calculations determining the monthly emission rate in pounds per calendar month for each EU of FG-GeoMet.
   d. VOC mass emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month for FG-GeoMet.

   The permittee shall keep the records in a format acceptable to the AQD District Supervisor and make them available to the Department upon request.[2] **(R 336.1702(d))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-GeoMet-01 (Paint Booth - SV0042)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
2. SV-GeoMet-02 (Paint Booth - SV0043)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
3. SV-GeoMet-03 (Cure Station - SV0045)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
4. SV-GeoMetII-01 (Paint Booth - SV0053)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
5. SV-GeoMetII-02 (Paint Booth - SV0054)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
6. SV-GeoMetII-03 (Cure Station - SV0056)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR Part 63, Subpart A and Subpart MMMM for Surface Coating of Miscellaneous Metal Parts and Products.[2] **(40 CFR Part 63 Subparts A and MMMM)**

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-Magni&Black
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Six automotive metal surface coating lines.

Emission Units: EU-Black, EU-Magni-01, EU-Magni-02, EU-Magni-03, EU-Magni-04, EU-Magni-05

POLLUTION CONTROL EQUIPMENT

Dry filters are used to collect any overspray from the coating process.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOCs	9.4 tpy[2]	12-month rolling time period as determined at the end of each calendar month	FG-Magni&Black	SC VI.2 SC VI.3	**R 336.1702(a)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOCs	3.5 lb/gal (minus water)[a] as applied[2]	Instantaneous	FG-Magni&Black	SC V.1	**R 336.1702(a)**

[a] The phrase "minus water" shall also include compounds which are used as organic solvents and which are excluded from the definition of volatile organic compound. **(R 336.1602(4))**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall capture all waste coatings, cleanup and purge solvents (materials) and shall store them in closed containers. The permittee shall dispose of all waste materials in an acceptable manner in compliance with all applicable state rules and federal regulations.[2] **(R 336.1702(a))**

2. The permittee shall dispose of spent filters in a manner which minimizes the introduction of air contaminants to the outer air.[2] **(R 336.1224, R 336.1370)**

3. The permittee shall handle all VOC and / or HAP containing materials, including coatings, reducers, solvents and thinners, in a manner to minimize the generation of fugitive emissions. The permittee shall keep containers covered at all times except when operator access is necessary.[2] **(R 336.1205, R 336.1225, R 336.1702(a))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate FG-Magni&Black unless all respective exhaust filters are installed, maintained and operated in a satisfactory manner.[2] **(R 336.1224, R 336.1301, R 336.1910)**

2. The permittee shall equip and maintain FG-Magni&Black with HVLP applicators or comparable technology with equivalent transfer efficiency. For HVLP applicators, the permittee shall keep test caps available for pressure testing.[2] **(R 336.1702(a))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall determine the VOC content, water content and density of any coating, as applied and as received, using federal Reference Test Method 24. Upon prior written approval by the AQD District Supervisor, the permittee may determine the VOC content from manufacturer's formulation data. If the Method 24 and the formulation values should differ, the permittee shall use the Method 24 results to determine compliance.[2] **(R 336.1702, R 336.2001, R 336.2003, R 336.2004, R 336.2040(5))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the 15th day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition.[2] **(R 336.1225, R 336.1702)**

2. The permittee shall maintain a current listing from the manufacturer of the chemical composition of each coating, cleanup and purge solvents, including the weight percent of each component. The data may consist of Material Safety Data Sheets, manufacturer's formulation data, or both as deemed acceptable by the AQD District Supervisor. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1225, R 336.1702)**

3. The permittee shall keep the following information on a calendar month basis for FG-Magni&Black:
   a. Gallons (with water) of each coating, cleanup and purge solvents (material) used and reclaimed.
   b. VOC content (minus water and with water) of each material as applied.
   c. VOC mass emission calculations determining the monthly emission rate in tons per calendar month.
   d. VOC mass emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month.

   The permittee shall keep the records in a format acceptable to the AQD District Supervisor and make them available to the Department upon request.[2] **(R 336.1702(a))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-SprimagBlack (Exhaust - SV0021)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
2. SV-Magni-01 (Exhaust - SV0052)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
3. SV-Magni-02 (Exhaust - SV0060)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
4. SV-Magni-03 (Exhaust - SV0063)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
5. SV-Magni-04 (Exhaust - SV0064)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
6. SV-Magni-05 (Exhaust - SV0065)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR Part 63, Subpart A and Subpart MMMM for Surface Coating of Miscellaneous Metal Parts and Products.[2] **(40 CFR Part 63 Subparts A and MMMM)**

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-Zinc
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Five automotive metal surface coating lines.

Emission Units: EU-Zinc-01, EU-Zinc-02, EU-Zinc-03, EU-Zinc-04, EU-Zinc-05-Blechtopf

POLLUTION CONTROL EQUIPMENT

Dry filters are used to collect any overspray from the coating process.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOCs	43.5 tpy[2]	12-month rolling time period as determined at the end of each calendar month	FG-Zinc	SC VI.2 SC VI.3	**R 336.1702(a)**
2. Xylene (CAS No. 1330-20-7)	103.5 pounds per day[1]	Calendar day	FG-Zinc	SC VI.2 SC VI.4	**R 336.1225(1)**

II. MATERIAL LIMIT(S)

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOCs	3.5 lb/gal (minus water)[a] as applied[2]	Instantaneous	FG-Zinc	SC V.1	**R 336.1702(a)**

[a] The phrase "minus water" shall also include compounds which are used as organic solvents and which are excluded from the definition of volatile organic compound. **(R 336.1602(4))**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall capture all waste coatings, cleanup and purge solvents (materials) and shall store them in closed containers. The permittee shall dispose of all waste materials in an acceptable manner in compliance with all applicable state rules and federal regulations.[2] **(R 336.1702(a))**

2. The permittee shall dispose of spent filters in a manner which minimizes the introduction of air contaminants to the outer air.[2] **(R 336.1224, R 336.1370)**

3. The permittee shall handle all VOC and / or HAP containing materials, including coatings, reducers, solvents and thinners, in a manner to minimize the generation of fugitive emissions. The permittee shall keep containers covered at all times except when operator access is necessary.[2] **(R 336.1205, R 336.1225, R 336.1702(a))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate FG-Zinc unless all respective exhaust filters are installed, maintained and operated in a satisfactory manner.[2] **(R 336.1224, R 336.1301, R 336.1910)**

2. The permittee shall equip and maintain FG-Zinc with HVLP applicators or comparable technology with equivalent transfer efficiency. For HVLP applicators, the permittee shall keep test caps available for pressure testing.[2] **(R 336.1702(a))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall determine the VOC content, water content and density of any coating, as applied and as received, using federal Reference Test Method 24. Upon prior written approval by the AQD District Supervisor, the permittee may determine the VOC content from manufacturer's formulation data. If the Method 24 and the formulation values should differ, the permittee shall use the Method 24 results to determine compliance.[2] **(R 336.1702, R 336.2001, R 336.2003, R 336.2004, R 336.2040(5))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the 15th day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition.[2] **(R 336.1225, R 336.1702)**

2. The permittee shall maintain a current listing from the manufacturer of the chemical composition of each coating, cleanup and purge solvents, including the weight percent of each component. The data may consist of Material Safety Data Sheets, manufacturer's formulation data, or both as deemed acceptable by the AQD District Supervisor. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1225, R 336.1702)**

3. The permittee shall keep the following information on a calendar month basis for FG-Zinc:
   a. Gallons (with water) of each coating, cleanup and purge solvents (material) used and reclaimed.
   b. VOC content (minus water and with water) of each material as applied.
   c. VOC mass emission calculations determining the monthly emission rate in tons per calendar month.
   d. VOC mass emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month.

   The permittee shall keep the records in a format acceptable to the AQD District Supervisor and make them available to the Department upon request.[2] **(R 336.1702(a))**

4. The permittee shall keep the following information on a calendar day basis for FG-Zinc:
   a. Gallons of each xylene (CAS No. 1330-20-7) containing material used and reclaimed.
   b. The xylene (CAS No. 1330-20-7) content in pounds per gallon of each material used.
   c. Xylene (CAS No. 1330-20-7) mass emission calculations determining the daily emission rate in pounds per calendar day.

   The permittee shall keep the records in a format acceptable to the AQD District Supervisor and make them available to the Department upon request.[1] **(R 336.1225(1))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-Zinc-01 (Exhaust - SV0026)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
2. SV-SprimagZinc-01 (Spray Station - SV0022)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
3. SV-SprimagZinc-02 (Flash Off - SV0023)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
4. SV-SprimagZinc-03 (Cooling Zone - SV0025)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
5. SV-BrentroZinc-01 (Exhaust - SV0048)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
6. SV-BrentroZinc-02 (Exhaust - SV0059)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
7. SV-Blechtopf-01 (Spray Station - SV0061)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**
8. SV-Blechtopf-02 (Drying Area - SV0062)	20^2	40^2	**R 336.1225, 40 CFR 52.21(c) & (d)**

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR Part 63, Subpart A and Subpart MMMM for Surface Coating of Miscellaneous Metal Parts and Products.[2] **(40 CFR Part 63 Subparts A and MMMM)**

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-MISCMETAL
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

All metal parts coating lines operating per the requirements of R 336.1621(10)(b), including equipment covered by other permits and exempt equipment.

Emission Units: EU-GeoMet-01, EU-GeoMet-02

POLLUTION CONTROL EQUIPMENT

Dry filters are used to collect any overspray from the coating process.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. VOC	Less than 30.0 tpy[2]	12-month rolling time period as determined at the end of each calendar month	All metal parts coating lines operating per the requirements of R 336.1621(10)(b).	SC VI.2 SC VI.3	**R 336.1702(d)**

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the 15th day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition.[2] **(R 336.1205(3))**

2. The permittee shall maintain a current listing from the manufacturer of the chemical composition of each coating and reducer including the weight percent of each component. The data may consist of Material Safety Data Sheets, manufacturer's formulation data, or both as deemed acceptable by the AQD District Supervisor. The

permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1702(d))**

3. The permittee shall keep the following information on a calendar day basis for all metal parts coating lines operating per the requirements of R 336.1621(10)(b):
   a. Gallons or pounds of each VOC containing coating used.
   b. VOC content, in pounds per gallon or pounds per pound, of each VOC containing coating used.
   c. VOC emission calculations determining the monthly emission rate in tons per calendar month.
   d. VOC emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month from the coating of metal parts.

   The permittee shall keep the records in a format acceptable to the AQD District Supervisor. The permittee shall keep all records on file and make them available to the Department upon request.[2] **(R 336.1702(d))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
NA	NA	NA	NA

IX. OTHER REQUIREMENT(S)

NA

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-MACT MMMM
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Each new, reconstructed, and existing affected source described in 40 CFR 63.3881(a)(1), including the subcategories listed in 40 CFR, Part 63, Subpart MMMM, 63.3881(a)(2) through (6), meeting the applicability requirements of 40 CFR 63.3881(b), which is engaged in the surface coating of miscellaneous metal parts and products. The affected source includes the collection of all the items listed in 40 CFR 63.3882(b)(1) through (4). Surface coating is defined by 40 CFR 63.3881 as the application of coating to a substrate using, for example, spray guns or dip tanks. Surface coating also includes associated activities, such as surface preparation, cleaning, mixing, and storage if they are directly related to the application of the coating. 40 CFR, Part 63, Subpart MMMM, does not apply to surface coating or a coating operation that meets any of the criteria of 40 CFR 63.3881(c)(1) through (17).

Emission Units: EU-GeoMet-01, EU-GeoMet-02, EU-Black, EU-Magni-01, EU-Magni-02, EU-Magni-03, EU-Magni-04, EU-Magni-05, EU-Zinc-01, EU-Zinc-02, EU-Zinc-03, EU-Zinc-04, EU-Zinc-05-Blechtopf

POLLUTION CONTROL EQUIPMENT

Dry filters are used to collect any overspray from the coating process.

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Organic HAP	2.6 lb/gal of coating solids[2]	12-month rolling time period as determined at the end of each calendar month	Existing – General Use Coating	SC VI.1 through SC VI.5	**40 CFR 63.3890(b)(1)**

II. MATERIAL LIMIT(S)

For the compliant materials option, the permittee shall meet the material limits specified in the following table.

Material	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. Each Thinner and/or Additive	No Organic HAP[2] *	Instantaneous	Each Coating Operation using Compliant Material Option	SC VI.1 through SC VI.5	**40 CFR 63.3891(a)**
2. Each Cleaning Material	No Organic HAP[2] *	Instantaneous	Each Coating Operation using Compliant Material Option	SC VI.1 through SC VI.5	**40 CFR 63.3891(a)**
* Determined according to 40 CFR 63.3941(a).					

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall determine whether the organic HAP emission rate is equal to or less than the applicable emission limits in 40 CFR 63.3890 using at least one of the following three options, which are listed in 40 CFR 63.3891(a) through (c):
   a. Compliant material option,
   b. Emission rate without add-on controls option, or
   c. Emission rate with add-on controls option.

The permittee shall include all coatings, thinners, and/or other additives, and cleaning materials used when determining the emission rate.[2] **(40 CFR 63.3891)**

2. Any coating operation(s) using the compliant material option or the emission rate without add-on controls option, shall be in compliance with the applicable emission limits in 40 CFR 63.3890 at all times.[2] **(40 CFR 63.3900(a)(1))**

3. If the surface coating operation(s) meet the applicability criteria of more than one of the subcategory emission limits specified in 40 CFR 63.3890(a) or (b), the permittee may comply separately with each subcategory emission limit, or comply using one of the alternatives in 40 CFR 63.3890(c)(1) or (2).[2] **(40 CFR 63.3890(c))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

NA

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. The permittee shall conduct an initial compliance demonstration for the initial compliance period according to the requirements in 40 CFR 63.3941, 40 CFR 63.3951, or 40 CFR 63.3961. The initial compliance period begins on the applicable compliance date specified in 40 CFR 63.3883 and ends on the last day of the 12th month following the compliance date. If the compliance date occurs on any day other than the first of the month, then the compliance period extends through that month plus the next 12 months.[2] **(40 CFR 63.3940, 40 CFR 63.3950, 40 CFR 63.3960)**

2. The permittee shall keep all records required by 40 CFR 63.3930 in the format and timeframes outlined in 40 CFR 63.3931.[2] **(40 CFR 63.3942(d), 40 CFR 63.3952(d), 40 CFR 63.3963(j))**

3. The permittee shall maintain, at a minimum, the following records for each compliance period[2]:
   a. A copy of each notification and report that is submitted to comply with Subpart MMMM, and the documentation supporting each notification and report. **(40 CFR 63.3930(a))**
   b. A current copy of information provided by materials suppliers or manufacturers, such as manufacturer's formulation data, or test data used to determine the mass fraction of organic HAP and density of each coating, thinner and/or other additive, and cleaning material, and the volume fraction of coating solids for each coating. **(40 CFR 63.3930(b))**
   c. A list of the coating operations on which each compliance option was used, and the beginning and ending dates and times for each compliance option used. **(40 CFR 63.3930(c)(1))**
   d. For the compliant materials option, the calculation of the organic HAP content for each coating, using Equation 2 of 40 CFR 63.3941. **(40 CFR 63.3930(c)(2))**
   e. For the emission rate without add-on controls option, the calculation of the total mass of organic HAP emissions for the coatings, thinners and/or additives, and cleaning materials used each month using Equations 1, 1A through 1C and 2 of 40 CFR 63.3951; and, if applicable, the calculation used to determine mass of organic HAP in waste materials according to 40 CFR 63.3951(e)(4); the calculation of the total volume of coating solids used each month using Equation 2 of 40 CFR 63.3951; and the calculation of each 12-month organic HAP emission rate using Equation 3 of 40 CFR 63.3951. **(40 CFR 63.3930(c)(3))**
   f. The name and mass or volume of each coating, thinner and/or other additive, and cleaning material used during each compliance period. If the compliant material option is used for all coatings at the affected source, the permittee may maintain purchase records for each material used rather than a record of the volume used. **(40 CFR 63.3930(d))**
   g. The mass fraction of organic HAP for each coating, thinner and/or additive, and cleaning material used during each compliance period unless the material is tracked by weight. **(40 CFR 63.3930(e))**

h. The volume fraction of coating solids for each coating used during each compliance period. **(40 CFR 63.3930(f))**

i. The density of for each coating, thinner and/or other additive, and cleaning material used during each compliance period. **(40 CFR 63.3930(g))**

j. The information specified in 40 CFR 63.3930(h)(1) through (3), if an allowance is used in Equation 1 of 40 CFR 63.3951 for organic HAP contained in waste materials sent to or designated for shipment to a treatment, storage, and disposal facility (TSDF) according to 40 CFR 63.3951(e)(4). **(40 CFR 63.3930(h))**

k. The date, time, and duration of each deviation. **(40 CFR 63.3930(j))**

4. For each coating used for the compliant coating option, the permittee shall demonstrate continuous compliance with the emission limit in 40 CFR 63.3890, for each compliance period, using Equation 2 of 40 CFR 63.3941. For each thinner and cleaning material used, the permittee shall determine continuous compliance according to 40 CFR 63.3941(a).[2] **(40 CFR 63.3942)**

5. For any coating operation or group of coating operations using the emission rate without add-on controls option, the permittee shall demonstrate continuous compliance with the applicable organic HAP emission limit in 40 CFR 63.3890, for each compliance period, according to 40 CFR 63.3951(a) through (g).[2] **(40 CFR 63.3952)**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

4. For the compliant material option, if any coating used for any 12-month compliance period exceeds the applicable emission limit specified in 40 CFR 63.3890; or any thinner or cleaning material used contains any organic HAP, the permittee shall report this as a deviation as specified in 40 CFR 63.3910(c)(6) and 40 CFR 63.3920(a)(5).[2] **(40 CFR 63.3942(b))**

5. For the emission rate without add-on controls, if the organic HAP emission rate for any 12-month compliance period exceeds the applicable emission limit specified in 40 CFR 63.3890, the permittee shall report this as a deviation as specified in 40 CFR 63.3910(c)(6) and 40 CFR 63.3920(a)(6).[2] **(40 CFR 63.3952(b))**

6. The Permittee shall submit the applicable notifications specified in 40 CFR 63.7(b) and (c), 63.8(f)(4) and 63.9(b) through (e) and (h), an initial notification and a notification of compliance status as specified in 40 CFR 63.3910.[2] **(40 CFR Part 63 Subparts A and MMMM)**

7. The permittee shall submit all semiannual compliance reports specified in 40 CFR 63.3920(a). Each semiannual compliance report shall identify which coating operation(s) used each compliance option, and if there were no deviations from the emission limitations in 40 CFR 63.3890, include a statement that the coating operations were in compliance.[2] **(40 CFR 63.3920, 40 CFR 63.3942(c), 40 CFR 63.3952(c), 40 CFR 63.3963(f))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
NA	NA	NA	NA

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR Part 63, Subpart A and Subpart MMMM for Surface Coating of Miscellaneous Metal Parts and Products by the initial compliance date.[2] **(40 CFR Part 63 Subparts A and MMMM)**

Footnotes:
[1]This condition is state-only enforceable and was established pursuant to Rule 201(1)(b).
[2]This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

FG-COLDCLEANERS
FLEXIBLE GROUP CONDITIONS

DESCRIPTION

Any cold cleaner that is grandfathered or exempt from Rule 201 pursuant to Rule 278 and Rule 281(h), or Rule 285(r)(iv). Existing cold cleaners were placed into operation prior to July 1, 1979. New cold cleaners were placed into operation on or after July 1, 1979.

Emission Unit: EU-COLDCLEANERS

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

NA

II. MATERIAL LIMIT(S)

1. The permittee shall not use cleaning solvents containing more than five percent by weight of the following halogenated compounds: methylene chloride, perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, chloroform, or any combination thereof. **(R 336.1213(2))**

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. Cleaned parts shall be drained for no less than 15 seconds or until dripping ceases. **(R 336.1611(2)(b), R 336.1707(3)(b))**

2. The permittee shall perform routine maintenance on each cold cleaner as recommended by the manufacturer. **(R 336.1213(3))**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The cold cleaner must meet one of the following design requirements:
   a. The air/vapor interface of the cold cleaner is no more than ten square feet. **(R 336.1281(h))**
   b. The cold cleaner is used for cleaning metal parts and the emissions are released to the general in-plant environment. **(R 336.1285(r)(iv))**

2. The cold cleaner shall be equipped with a device for draining cleaned parts. **(R 336.1611(2)(b), R 336.1707(3)(b))**

3. All new and existing cold cleaners shall be equipped with a cover and the cover shall be closed whenever parts are not being handled in the cold cleaner. **(R 336.1611(2)(a), R 336.1707(3)(a))**

4. The cover of a new cold cleaner shall be mechanically assisted if the Reid vapor pressure of the solvent is more than 0.3 psia or if the solvent is agitated or heated. **(R 336.1707(3)(a))**

5. If the Reid vapor pressure of any solvent used in a new cold cleaner is greater than 0.6 psia; or, if any solvent used in a new cold cleaner is heated above 120 degrees fahrenheit, then the cold cleaner must comply with at least one of the following provisions:
   a. The cold cleaner must be designed such that the ratio of the freeboard height to the width of the cleaner is equal to or greater than 0.7. **(R 336.1707(2)(a))**
   b. The solvent bath must be covered with water if the solvent is insoluble and has a specific gravity of more than 1.0. **(R 336.1707(2)(b))**

c. The cold cleaner must be controlled by a carbon adsorption system, condensation system, or other method of equivalent control approved by the AQD. **(R 336.1707(2)(c))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

NA

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1213(3)(b)(ii))**

1. For each new cold cleaner in which the solvent is heated, the solvent temperature shall be monitored and recorded at least once each calendar week during routine operating conditions. **(R 336.1213(3))**

2. The permittee shall maintain the following information on file for each cold cleaner **(R 336.1213(3))**:
   a. A serial number, model number, or other unique identifier for each cold cleaner.
   b. The date the unit was installed, manufactured or that it commenced operation.
   c. The air/vapor interface area for any unit claimed to be exempt under Rule 281(h).
   d. The applicable Rule 201 exemption.
   e. The Reid vapor pressure of each solvent used.
   f. If applicable, the option chosen to comply with Rule 707(2).

3. The permittee shall maintain written operating procedures for each cold cleaner. These written procedures shall be posted in an accessible, conspicuous location near each cold cleaner. **(R 336.1611(3), R 336.1707(4))**

4. As noted in Rule 611(2)(c) and Rule 707(3)(c), if applicable, an initial demonstration that the waste solvent is a safety hazard shall be made prior to storage in non-closed containers. If the waste solvent is a safety hazard and is stored in non-closed containers, verification that the waste solvent is disposed of so that not more than 20 percent, by weight, is allowed to evaporate into the atmosphere shall be made on a monthly basis. **(R 336.1213(3), R 336.1611(2)(c), R 336.1707(3)(c))**

VII. REPORTING

1. Prompt reporting of deviations pursuant to General Conditions 21 and 22 of Part A. **(R 336.1213(3)(c)(ii))**

2. Semiannual reporting of monitoring and deviations pursuant to General Condition 23 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(R 336.1213(3)(c)(i))**

3. Annual certification of compliance pursuant to General Conditions 19 and 20 of Part A. The report shall be postmarked or received by the appropriate AQD District Office by March 15 for the previous calendar year. **(R 336.1213(4)(c))**

See Appendix 8

VIII. STACK/VENT RESTRICTION(S)

NA

IX. OTHER REQUIREMENT(S)

NA

E. NON-APPLICABLE REQUIREMENTS

At the time of the ROP issuance, the AQD has determined that no non-applicable requirements have been identified for incorporation into the permit shield provision set forth in the General Conditions in Part A pursuant to Rule 213(6)(a)(ii).

APPENDICES

Appendix 1. Abbreviations and Acronyms

The following is an alphabetical listing of abbreviations/acronyms that may be used in this permit.

AQD	Air Quality Division	MM	Million
acfm	Actual cubic feet per minute	MSDS	Material Safety Data Sheet
BACT	Best Available Control Technology	MW	Megawatts
BTU	British Thermal Unit	NA	Not Applicable
°C	Degrees Celsius	NAAQS	National Ambient Air Quality Standards
CAA	Federal Clean Air Act	NESHAP	National Emission Standard for Hazardous Air Pollutants
CAM	Compliance Assurance Monitoring	NMOC	Non-methane Organic Compounds
CEM	Continuous Emission Monitoring	NOx	Oxides of Nitrogen
CFR	Code of Federal Regulations	NSPS	New Source Performance Standards
CO	Carbon Monoxide	NSR	New Source Review
COM	Continuous Opacity Monitoring	PM	Particulate Matter
department	Michigan Department of Environmental Quality	PM-10	Particulate Matter less than 10 microns in diameter
dscf	Dry standard cubic foot	pph	Pound per hour
dscm	Dry standard cubic meter	ppm	Parts per million
EPA	United States Environmental Protection Agency	ppmv	Parts per million by volume
EU	Emission Unit	ppmw	Parts per million by weight
°F	Degrees Fahrenheit	PS	Performance Specification
FG	Flexible Group	PSD	Prevention of Significant Deterioration
GACS	Gallon of Applied Coating Solids	psia	Pounds per square inch absolute
GC	General Condition	psig	Pounds per square inch gauge
gr	Grains	PeTE	Permanent Total Enclosure
HAP	Hazardous Air Pollutant	PTI	Permit to Install
Hg	Mercury	RACT	Reasonable Available Control Technology
hr	Hour	ROP	Renewable Operating Permit
HP	Horsepower	SC	Special Condition
H_2S	Hydrogen Sulfide	scf	Standard cubic feet
HVLP	High Volume Low Pressure *	sec	Seconds
ID	Identification (Number)	SCR	Selective Catalytic Reduction
IRSL	Initial Risk Screening Level	SO_2	Sulfur Dioxide
ITSL	Initial Threshold Screening Level	SRN	State Registration Number
LAER	Lowest Achievable Emission Rate	TAC	Toxic Air Contaminant
lb	Pound	Temp	Temperature
m	Meter	THC	Total Hydrocarbons
MACT	Maximum Achievable Control Technology	tpy	Tons per year
MAERS	Michigan Air Emissions Reporting System	µg	Microgram
MAP	Malfunction Abatement Plan	VE	Visible Emissions
MDEQ	Michigan Department of Environmental Quality	VOC	Volatile Organic Compounds
mg	Milligram	yr	Year
mm	Millimeter		

*For HVLP applicators, the pressure measured at the gun air cap shall not exceed 10 pounds per square inch gauge (psig).

Appendix 2. Schedule of Compliance

The permittee certified in the ROP application that this stationary source is in compliance with all applicable requirements and the permittee shall continue to comply with all terms and conditions of this ROP. A Schedule of Compliance is not required. **(R 336.1213(4)(a), R 336.1119(a)(ii))**

Appendix 3. Monitoring Requirements

Specific monitoring requirement procedures, methods or specifications are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 4. Recordkeeping

Specific recordkeeping requirement formats and procedures are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 5. Testing Procedures

Specific testing requirement plans, procedures, and averaging times are detailed in the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, this appendix is not applicable.

Appendix 6. Permits to Install

The following table lists any PTI and/or Operate that relate to the identified emission units or flexible groups as of the effective date of this ROP. This includes all PTI and/or Operate that are hereby incorporated into Source-Wide PTI No. MI-PTI-N6226-201X. The PTIs issued after the effective date of this ROP, including amendments or modifications, will be identified in Appendix 6 upon renewal.

Permit to Install Number	Description of Equipment	Corresponding Emission Unit(s) or Flexible Group(s)
145-12A	Thirteen automotive metal surface coating lines.	FG-GeoMet FG-Magni&Black FG-Zinc FG-MISCMETAL FG-MACT MMMM

Appendix 7. Emission Calculations

Specific emission calculations to be used with monitoring, testing or recordkeeping data are detailed in the appropriate Source-Wide, Emission Unit and/or Flexible group Special Conditions. Therefore, this appendix is not applicable.

Appendix 8. Reporting

A. Annual, Semiannual, and Deviation Certification Reporting

The permittee shall use the MDEQ, AQD, Report Certification form (EQP 5736) and MDEQ, AQD, Deviation Report form (EQP 5737) for the annual, semiannual and deviation certification reporting referenced in the Reporting Section of the Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Alternative formats must meet the provisions of Rule 213(4)(c) and Rule 213(3)(c)(i), respectively, and be approved by the AQD District Supervisor.

B. Other Reporting

Specific reporting requirement formats and procedures are detailed in Part A or the appropriate Source-Wide, Emission Unit and/or Flexible Group Special Conditions. Therefore, Part B of this appendix is not applicable.

Appendix Q
Air Dispersion Modeling Protocol

Air Dispersion Modeling Protocol

Document to Support Air Permit Application Correction

Fritz Winter North America LP

1 Fritz Way Franklin, Kentucky

July 2025

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Project 1027.017

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Section 1
Introduction

1.1 Document Description and Purpose

This document provides the protocol for the air quality analysis portion of the permit application to demonstrate the permitted major stationary source has not and will not "cause or contribute" to a violation of any applicable National Ambient Air Quality Standard (NAAQS) or Prevention of Significant Deterioration (PSD) increment.

This protocol will also be used to demonstrate that the major stationary source will comply with 401 KAR 63:020 that regulates potential hazardous matter or toxics substances (i.e., toxic air pollutants – TAPs).

The original air permit application for the facility was supported by an initial modeling protocol submitted in 2016. A subsequent protocol was submitted in 2021 to support a February 2022 application for revisions to the issued 2017 Air Permit. Because no action was taken on the February 2022 application, a third protocol has been prepared. The third version of the protocol does not deviate significantly from the 2021 protocol and incorporates the comments received from both DAQ and USEPA, Region IV.

1.2 Facility and Location

Fritz Winter North America LP (FWNA) operates a gray iron foundry and machining operation to produce automotive parts, predominantly brake rotors as authorized by Air Quality Permit V-16-022 R1 (Air Permit) issued on November 25, 2017.

The facility is located at the Wilkey North Industrial Park located in Franklin (Simpson County), Kentucky. The facility is located approximately 5 miles north of Franklin and 13 miles south of Bowling Green along State Route 31W.

The Franklin, Kentucky location is listed under the Standard Industrial Classification (SIC) code of 3714 – Motor Vehicle Parts and Accessories. The maximum production capacity of the foundry and machining operation is based on 91,586 tons of molten gray iron poured per year.

1.3 Process Overview

Molten metal is produced by introducing metallic charge materials, alloys, and fluxes into one of the four electric induction furnaces (EIFs) located at the Franklin, Kentucky facility. The process of producing cast iron metal parts first involves fabricating a green sand mold and then filling the mold with molten iron. Once the metal cools and solidifies, the mold is broken to recover the cast metal part which then undergoes cleaning, machining, and painting. Sand from the broken mold is mechanically reclaimed and prepared for reuse as molding sand.

Emissions at the iron foundry and machining operations result primarily from EIF melting, pouring and mold cooling, shakeout, shotblast, grinding, sand handling, coremaking and coating. Particulate

emissions from these operations are captured and controlled by a number of fabric filters . An acid scrubber controls the emission of amine gas used as a catalyst during the production of cores (i.e., coremaking).

A detailed description of each source and air pollution control device will be provided in the air permit application.

1.4 Project Background

As a result of Air Permit required initial performance testing, it was determined that certain established emission limitations were not met. This section identifies the units and pollutants where emission limitations were exceeded and provides a brief analysis of likely causes.

1.4.1 Applicable Permit Limits

In addition to and in concert with other applicable sections, Section B (Foundry Operations), Section B (Coating Operations) 3.c., Section D.5, Section D.7, Section G.4.e, Section G.4.h, Section G.5. and Section H.2. of Air Quality Permit V-16-022 R1 issued on November 25, 2017 includes provisions to conduct performance (emission) testing to verify compliance with permit established emission limitations.

During 2018 and prior to the installation of Control Device CU08 with Stack ST09 (identified in a format of Control Device ID/Stack ID, e.g., CU08/ST09 throughout this document), FWNA was to comply with Alternative Operating Scenario #2 provided for in Section H of the referenced air permit.

Alternative Operating Scenario #2 allowed the foundry to temporarily exhaust emission units EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59 to Baghouse CU01 (CU01/ST02) prior to the installation of CU08/ST09. Operating per Alternative Operating Scenario 2 is identified in the Air Permit as Phase 1 per the note at the bottom of the emission unit table provided in Section B (Foundry Operations).

When FWNA is conducting production activities under Alternative Operating Scenario #2, Section H.2 (i.e., Phase 1) of the air permit establishes PM, PM_{10} and $PM_{2.5}$ emission limitations for CU01/ST02 as shown in Table 1-1.

Table 1-1. PM/PM10/PM2.5 Emission Limitations - Phase 1

Control Device (Stack)	Emission Units Controlled	Type of Control and Pollutants Controlled	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02)	EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16, EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0010 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0010 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0006 gr/dscf 0.85 lb/hr 3.72 ton/yr

Section D.5 of the air permit provides the emission limitations for CU06/ST07 and CU11/ST12. These emission limits are effective when operating under Phase 1 as well as once the Baghouse CU08 is installed (i.e., Phase 2).

Section D.5 also identifies PM, PM_{10} and $PM_{2.5}$ emission limitations for CU01/ST02 and CU08/ST09 during Phase 2 (once Baghouse CU08/ST09 has been installed and the exhaust ducts from emission unit IDs EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59 moved from CU01/ST02 to CU08/ST09). [It is beneficial to note the facility continues to operate the existing coating operations under Section H. Alternative Operating Scenario #1].

Table 1-2 below provides those Section D.5 identified PM, PM_{10} and $PM_{2.5}$ emission limitations during Phase 2 for CU01/ST02 and CU08/ST09 as well as PM, PM_{10} and $PM_{2.5}$ emission limitations during both Phase 1 and Phase 2 for CU06/ST07 and CU11/ST12.

Comparing Table 1-1 and 1-2 it is worth noting that CU01/ST02 PM, PM_{10} and $PM_{2.5}$ emission limitations did not change to reflect the movement of a number of particulate matter generating sources from CU01/ST02 to CU08/ST09 as the facility transitioned from Phase 1 to Phase 2 operations. Put another way, prior to transitioning to CU08/ST09, a number of units with condensable particulate matter emissions were ducted to CU01/ST02. The CU01/ST02 emission limitations were not altered to reflect the possibility of the increased condensable emissions associated with these units during Phase 1 operations.

Table 1-2. PM/PM_{10}/PM2.5 Emission Limitations – Phase 2

Control Device (Stack)	Emission Units Controlled	Type of Control and Pollutants Controlled	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02)	EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0060 gr/dscf 0.850 lb/hr 3.72 ton/yr
CU06 (ST07)	EU22, EU23, EU24, EU26, EU27, EU28, EU29, EU30, EU31, EU32, EU53, EU54, EU55, EU56	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0015 gr/dscf 1.30 lb/hr 5.67 ton/yr
CU08 (ST09)	EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0015 gr/dscf 2.12 lb/hr 9.30 ton/yr
CU11 (ST12)	EU60, EU61, EU62, EU64, EU65	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0015 gr/dscf 0.792 lb/hr 3.47 ton/yr

Table 1-3 provides the volatile organic compound (VOC) and carbon monoxide (CO) emission limitations for CU1/ST02, CU07/ST08 (VOC only) and CU08/ST09. These emission limitations are effective under both Phase 1 and Phase 2. **Similar to the PM, PM_{10} and $PM_{2.5}$ issued identified above, CU08/ST09 has identified VOC and CO emissions rates that were not addressed within the emission limitations for CU01/ST02 when it was operating under Phase 1.**

Table 1-3. VOC and CO Emission Limitations

Stack or Vent	Emission Units Combined	BACT for VOC	BACT for CO
ST02	EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16	0.14 lb/hr; 0.61 ton/yr	2.11 lb/hr; 9.25 ton/yr
ST08	EU39, EU40, EU41, EU42	0.70 lb/hr; 1.67 ton/yr	N/A
ST09	EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59	20.8 lb/hr; 39.7 ton/yr	128 lb/hr; 235 ton/yr

Finally, Air Permit Section B.3.h. identifies performance test requirements for the Shakeout Conveyor (EU53) to determine compliance with VOC and CO BACT emission limits identified in Section B.2.e. and f. These emission limits are provided in Table 1-4 and apply during both Phase 1 and 2.

Table 1-4. VOC and CO Emission Limitations - Shakeout Conveyor (EU53)

Emission Unit	Emission Unit Description	BACT for VOC	BACT for CO
EU53	Shakeout Conveyor	0.10 lb/ton gray iron; 4.58 ton/yr	1.00 lb/ton gray iron; 25.3 lb/hr

1.4.2 Initial Performance Test Results (CU01/ST02) – Phase 1

During Phase 1 the initial performance testing was conducted for the Melt Shop Baghouse (CU01/ST02) and Sand System Baghouse (CU06/ST07) in November, 2018 and December, 2018. Results of those tests are provided in Table 1-5 and Table 1-6 for CU01/ST02 and CU06/ST07, respectively.

The CU06/ST07 results provided in Table 1-6 assumed the only source of VOC and/or CO emissions were from the Shakeout Conveyor (EU53), and therefore any VOC and CO emissions determined at the stack were assigned to the Shakeout Conveyor (EU53).

Table 1-5. November and December 2018 Test Results - CU01/ST02

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/hr)	CO (lb/hr)
Emission Limit	0.0010	0.0010	0.0006	0.14	2.11
Performance Test Result	0.00063	0.0017	0.0017	0.28	26.37

The performance test of the CU01/ST02 yielded results that exceeded the permitted emission rates for PM_{10}, $PM_{2.5}$, VOC, and CO. Again, as identified above, CU01/ST02 emission limitations in the Air Permit were not changed to reflect the emissions from the units temporarily ducted to CU01/ST02 during Phased 1 operations.

Table 1-6. November and December 2018 Test Results - CU06/ST07 and EU53

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/ton gray iron)	CO (lb/ton gray iron) (lb/hr)
Emission Limit	0.0025	0.0025	0.0015	0.1	1 25.3
Performance Test Result	0.00042	0.0120	0.012	0.2	0.3 5.13

The performance test of CU06/ST07 determined PM_{10} and $PM_{2.5}$ emissions exceeded applicable emission limits identified in Table 1-6 or correspondingly identified in Table 1-2.

As stated above, since CU06/ST07 was assumed to have no other sources of VOC and CO, it was inferred that those emission rates determined from testing CU06/ST07 were from the Shakeout Conveyor (EU53) and therefore indicated the Shakeout Conveyor exceeded the allowable VOC emission rate identified in Table 1-4.

1.4.3 Performance Testing Results – Phase 2

Section D.5 and D.6 of the Air Permit includes provisions to repeat performance testing following completion of Phase 2 construction activities. The Phase 2 construction activities included installation of Baghouse CU08/Stack ST09 and then relocating the exhaust ducts for several emission units from CU01/ST02 to CU08/ST09.

The performance test was conducted and the resulting pollutants in excess of emission limitations were $PM_{2.5}$, VOC, and CO for CU01/ST02 and $PM_{2.5}$ and VOC from CU06/ST07 and EU53, respectively. Note $PM_{2.5}$ emissions from CU01/ST02 and CU06/ST02 were only slightly above permitted limitations as was the VOC emissions from EU53.

A summary of the performance test results are provided and compared to the corresponding emission limits in Table 1-7 and Table 1-8.

Table 1-7. March 2020 Test Results - CU01/ST02

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/hr)	CO (lb/hr)
Emission Limit	0.0010	0.0010	0.0006	0.14	2.11
Performance Test Result	0.00042	0.0007	0.0007	1.42	7.77

Table 1-8. March 2020 Test Results - CU06/ST07 and EU53

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/ton gray iron)	CO (lb/ton gray iron) (lb/hr)
Emission Limit	0.0025	0.0025	0.0015	0.1	1 25.3
Performance Test Result	0.00091	0.0018	0.0018	0.11	0.086 1.24

1.4.4 Performance Test Results – June 2024

The 2022 application to modify the Air Permit was not acted upon by DAQ. At DAQ's request, FWNA agreed to perform additional performance testing, which was completed in June 2024. A comparison of the performance test results against the Air Permit emission limitations is presented in the tables below, followed by a summary discussion.

Table 1-9. June 2024 Test Results - CU01/ST02

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/hr)	CO (lb/hr)
Emission Limit	0.0010	0.0010	0.0006	0.14	2.11
Performance Test Result	0.0003	0.0005	0.0005	0.79	5.19

The results of the performance test validated the findings in Sections 1.4.2 and 1.4.3, confirming that VOC and CO emissions exceeded their respective pound-per-hour emission limits. While all forms of particulate matter remained within permitted thresholds, the production rate during testing was likely lower than typical operating conditions, potentially reducing inlet concentrations and biasing the measured emission rates.

Table 1-10. June 2024 Test Results - CU06/ST07

	PM (gr/dscf)	PM10 (gr/dscf)	PM2.5 (gr/dscf)	VOC (lb/ton gray iron)	CO (lb/ton gray iron) (lb/hr)
Emission Limit	0.0025	0.0025	0.0015	0.1	1 25.3
Performance Test Result	0.00057	0.0006	0.0006	0.552	0.46 2.02

The CU06/ST07 performance test results continue to indicate that VOC emissions exceed the applicable pound-per-hour emission limit. As previously noted, the reduced production rates during the test likely contributed to lower inlet concentrations, which may have affected the measured emission rates for particulate matter and carbon monoxide.

Table 1-11. June 2024 Test Results - CU08/ST09

	PM	PM10	PM2.5	VOC	CO
Emission Limit	0.0025 gr/dscf 3.54 lb/hr	0.0025 gr/dscf 3.54 lb/hr	0.0015 gr/dscf 2.12 lb/hr	0.87 lb/ton gray iron 20.8 lb/hr	5.13 lb/ton gray iron 128 lb/hr
Performance Test Result	0.0003 gr/dscf 0.22 lb/hr	0.0005 gr/dscf 0.38 lb/hr	0.0005 gr/dscf 0.38 lb/hr	3.23 lb/ton gray iron 13.9 lb/hr	5.42 lb/ton gray iron 22.6 lb/hr

The CU08/ST09 performance test did not indicate exceedances of the particulate outlet grain concentration or the hourly emission limits for any regulated pollutants. However, as previously noted, the lower production rates during testing likely influenced the measured emission results. To support a more representative comparison, VOC and CO emission rates were normalized to metal throughput. When evaluated on a metal tonnage basis, the results from the June 2024 performance test exceed the implied VOC and CO emission limits specified in the Air Permit.

1.4.5 Summary of Additional Performance Testing and Permit Implications

In addition to the above described test results, performance testing in 2018, 2019, 2020 and/or 2024 was conducted on the stacks associated with the Acid Scrubber CU07 (Stack ST08), Phase 2 installation of the Sand/Mold Baghouse CU08 (Stack ST09) and Paint Line 3 (CU14/ST15A), Paint Line 2 (CU15/ST15B) and Paint Line 1 (CU17/ST16). Based on the findings, the following Permit considerations are identified:

Acid Scrubber (CU07/ST08)

- The November 2018 test yielded unexpected carbon monoxide (CO) emissions despite no unlikely sources of the emissions and no underlying permitted emission limitations.

This is believed to be an anomaly and no changes to the permit application are proposed.

- The same above test showed VOC emissions at 84% of the allowable limit, even though the production rate was only 13% of the permitted capacity suggesting that higher emissions may occur at full load.
- The June 2024 yielded VOC emissions at approximately 225% of the permitted lb./hr emissions limit despite a significantly reduced production rate. This again indicates a potential need to reassess the VOC emission limits.

Fettling Baghouse (CU11/ST12)

- Performance testing in November 2018 and June 2024 confirmed compliance with the current emission limitations.

Paint Line Stacks (CU14/ST15A, CU15/ST15B, CU16/ST16)

- June 2024 performance testing for Paint Lines 3, 2 and 1 identified particulate and VOC emissions that may exceed annual permit limits.
- Particulate exceedances are attributed to underestimating outlet grain loading values in the original application.
- VOC emissions at Pain Line 3 and Paint Line 1 may require further evaluation to ensure coating usage rates are accurate and do not result in excess annual emissions.

1.4.6 Performance Test Results Analysis

The following provides a discussion of the likely causes of the excess emissions.

CU01 PM_{10}/$PM_{2.5}$ and CU06 $PM_{2.5}$ Emission Limit Exceedances

From reviewing the above PM results, the minimal PM outlet loading indicates the baghouses are performing extremely well at removing filterable PM. The results of the performance test show the measured emission rates meet the current permit PM BACT emission limitations. Potential causes of the emissions limit exceedance include:

- The exceedances of the PM_{10} and $PM_{2.5}$ emission limitation exceedances is the results of the prior permit application's failure to address condensable particulate emissions that can occur during foundry melting, pouring, cooling and/or shakeout operations. No foundry identified in the RACT/BACT/LAER Clearinghouse (RBLC) have PM_{10} and $PM_{2.5}$ emission rates, including condensable, at these low emission rates.
- As identified above, another reason the CU01/ST02 PM_{10} and $PM_{2.5}$ emission limitations were exceeded was a result of the additional emission units and their associated condensable particulate emissions venting to CU01/ST02 during Phase 1 while no accommodation was made in the Air Permit.

To address this issue a revised BACT evaluation will be conducted to determine appropriate PM_{10} and $PM_{2.5}$ emission rates for these operations.

CU01/ST02, CU06/ST07, and CU08/ST09 VOC/CO Emission Limit Exceedance

There are several factors that likely led to the excess VOC and CO emission limitations from these stacks and the emission unit. Those factors include the following:

- As identified above regarding the Phase 1 PM_{10} and $PM_{2.5}$ emission limitations, the Air Permit did not consider VOC and CO emission rates from the additional emission units vented to CU01 during Phase 1 when establishing the Air Permit limits.
- Second, VOC and CO emissions vary across pouring, cooling and shakeout based on a number of factors (e.g., cooling time). When assessing compliance with VOC and CO emission limitations it is important to aggregate the performance test results across the applicable stacks and compare those results against a grouped emissions limit for the selected units. The Air Permit did not provide for this allowance.
- Third, it does not appear the VOC Shakeout BACT determination accurately reflects the expected VOC emission rate. The prior BACT identified Waupaca Foundry as having a VOC emission limit of 0.1 lb./ton of metal. It is known Waupaca has not been able to demonstrate compliance with that emission limitation.
- Finally, we believe secondary capture of some emissions is occurring and being vented to these stacks resulting in greater emissions of VOC and CO.

CU07/ST08 VOC Emission Limit Exceedances
The emission rates in excess of the VOC hourly emissions limitation resulted in a review of the existing air pollution control device as well as correspondence with the resin supplier to develop improved emission estimates. The revised VOC emission rates will be included in the revised air permit application.

CU14/ST15A, CU15/ST15b and CU17/ST16 PM and VOC Emission Limits
The performance testing conducted on the stacks serving Paint Line 3 (EU68), Paint Line 2 (EU69) and Paint Line 1 (EU71) resulted in particulate and VOC emission rates that may exceed annual emission limitations. Outlet grain loading from the fabric filters will be evaluated as well as the coating usage rates for each of the three paint lines.

1.5 Revisions to Previous Permit Applications

Given the results of the above performance tests, the knowledge of other available foundry emissions information and the ongoing Air Permit Monitoring and Recordkeeping, a revised permit application will be submitted to address the above emission limitation exceedances. These changes are summarized in Table 1-9, 1-10 and 1-11 by comparing the expected revised emission rates and BACT to the same values provided in the current Air Permit.

Important aspects of each table can be summarized as follows:

- The largest Table 1-12 increase is a result of revisions made to the Pouring/Cooling and Coremaking VOC emission rates. A violation did not occur due to the low production rate experienced during the test. The table shows a reduction in PM and PM_{10} potential emission rates.
- Table 1-13 shows a decrease in potential emissions of PM and PM_{10} with a slight increase in $PM_{2.5}$ emissions.

In addition to the changes identified in Tables 1-10 and 1-11, the revised application will include requests for the following changes:

- Remove shotblast media limit as the emission factor is based on tons of metal processed;

- Change Section H, Alternative Operating Scenario 1, 1.c.Thinner Usage to reflect actual operation as well as reflect this Alternative Operating Scenario as the base scenario.
- Increase Core Wash usage to reflect actual usage rates;
- Add Rust Preventative and Snag Grinding emission units.
- Remove several emission units identified in the initial and revised permit application that will not be installed including Scrap Drying (EU03), Scrap Cleaning (EU04), Holding Furnace #1 (EU11), Holding Furnace #2 (EU12), Pouring Furnace #2 (EU16), PUCB Core Machine #3 (EU41), PUCB Core Machine #4 (EU42), Core Dryer #3 (EU46), Core Dryer #4 (EU47), Mold Assembly #2 (EU49) , Pouring #2 (EU51), Mold Shop Baghouse Waste Dust Silo (EU58), Steel Shot Blasting #2 (EU62), Paint Line #4 (EU70), Gasoline Storage Tank (EU75), and Paint Booth #3 (EU70).

Table 1-12. Compare 2017 to 2025 Emissions Increase

Pollutant	PSD SER (tpy)	2017 Permit Modification		2025 Permit Revision	
		Emissions Increase (tpy)	PSD Permitting Required? (Yes/No)	Emissions Increase (tpy)	PSD Permitting Required? (Yes/No)
Filterable PM	25	43.3	Yes	35.41	Yes
PM_{10}	15	47.3	Yes	35.41	Yes
$PM_{2.5}$	10	30.9	Yes	35.41	Yes
SO_2	40	1.49	No	2.00	No
NO_x	40	28.5	No	15.68	No
VOC	40	79.1	No	208.69	Yes
CO	100	297	Yes	334.98	Yes
Lead	0.6	0.28	No	0.02	No

Table 1-13. Comparison of Current to Proposed PM BACT

Control Device (Stack)	CURRENT PERMIT (2017)			2025 PROPOSED LIMITS			Comments on 2025 Proposed Limits
	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$	
CU01 (ST02)	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0006 gr/dscf 0.850 lb/hr 3.72 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	95th Upper CI all tests
CU06 (ST07)	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0015 gr/dscf 1.30 lb/hr 5.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	95th Upper CI all tests
CU08 (ST09)	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0015 gr/dscf 2.12 lb/hr 9.30 ton/yr	0.0005 gr/dscf 0.032 lb/hr 0.141 ton/yr	0.0005 gr/dscf 0.032 lb/hr 0.141 ton/yr	0.0005 gr/dscf 0.032 lb/hr 0.141 ton/yr	Only residual PM from Core Blower; Mixer vented to CU08
CU11 (ST12)	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0015 gr/dscf 0.792 lb/hr 3.47 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr	95th Upper CI all tests

Table 1-14. Comparison of Current to Proposed VOC and CO BACT

Stack or Vent	CURRENT PERMIT (2017)		2025 PROPOSED LIMITS		Comments on 2025 Proposed Limits
	BACT for VOC	BACT for CO	BACT for VOC	BACT for CO	
CU01 ST02	0.14 lb/hr; 0.61 ton/yr	2.11 lb/hr; 9.25 ton/yr	0.176 lb/ton gray iron 6.64 lb/hr; 7.04 ton/yr	2.05 lb/ton gray iron 75.90 lb/hr; 82.00 ton/yr	95th Upper CI all tests
CU06 ST07 (Previously EU53)	0.10 lb/ton gray iron; 4.58 ton/yr	1.00 lb/ton gray iron; 25.3 lb/hr	0.549 lb/ton gray iron 8.24 lb/hr; 21.96 ton/yr	0.478 lb/ton gray iron 0.72 lb/hr; 1.91 ton/yr	95th Upper CI all tests
CU07 ST08	0.70 lb/hr; 1.67 ton/yr	N/A	4.59 lb/ton core sand 11.87 lb/hr; 15.35 ton/yr	N/A	
CU08 ST09	20.8 lb/hr; 39.7 ton/yr	128 lb/hr; 235 ton/yr	3.561 lb/ton gray iron 58.82 lb/hr; 142.428 ton/yr	6.238 lb/ton gray iron 93.49 lb/hr; 250.43 ton/yr	95th Upper CI all tests

1.6 Protocol Overview

As stated previously, this document provides the protocol for an air quality analysis portion of the permit application to demonstrate that the major stationary source will not "cause or contribute" to a violation of any applicable National Ambient Air Quality Standard (NAAQS) or Prevention of Significant Deterioration (PSD) increment. This protocol will also be used to demonstrate that the major stationary source will comply with 401 KAR 63:020 that regulates potential hazardous matter or toxics substances (i.e., toxic air pollutants – TAPs).

As the installation has not demonstrated compliance with a number of applicable emission units, this air permitting effort is viewed as a revision to the existing Air Permit. Similar to the initial and subsequent modeling this protocol proposes use of updated off-site ambient monitoring information to provide needed background concentrations while also integrating the most recent and available 5 years of meteorological information.

The stack parameters, including release heights, exhaust temperatures, exit velocities, and inside stack-diameters for the fabric filters and any other release points have been reviewed and updated as necessary and are provided in Section 4 of this document.

Emission rates for each modeled pollutant has been updated in the air permit application and are incorporated into this revised air dispersion modeling analysis.

1.7 NSR Applicability

The initial installation and subsequently issued permit estimated emissions above the Prevention of Significant Deterioration (PSD) major source threshold for carbon monoxide (CO). In addition, the project has significant emission rates of particulate matter (PM), PM with an aerodynamic diameter of less than 10 microns (PM_{10}), and PM with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$). Revised emissions calculations now project that potential volatile organic compounds (VOCs) emissions will now exceed the major source threshold.

The total emissions from the application to support the 2017 air permit along with the current emission increase from the revised permit application are shown in Table 1-12.

1.8 Air Quality Analysis

As part of the PSD review process, the completion of an air quality dispersion modeling analysis is required to demonstrate that potential impacts from the proposed project will not:

- Cause or contribute to a violation of any applicable NAAQS;
- Exceed a PSD increment; or
- Significantly Affect AQRVs in Class I areas.

This demonstration will be performed for PM_{10}, $PM_{2.5}$ and CO, the pollutants that require PSD review. Emissions of VOC is proposed to be addressed by Application of the EPA's Modeled Emission Rates for Precursors (MERPS).

A project subject to PSD regulations must demonstrate compliance with applicable National Ambient Air Quality Standards (NAAQS) and PSD increments through an air dispersion modeling analysis. To assist in the timely review of the modeling analysis that will be submitted with the complete air permit application, FWNA requests Kentucky Division for Air Quality's (KDAQ's) written approval of this proposed modeling protocol.

Section 2
Model Selection

2.1 Model Selection Summary

A summary of the AERMOD and pre-processor versions that will be used for the project is identified in Table 2-1. These or newer versions as they are adopted by the United States Environmental Protection Agency (USEPA) will be used to demonstrate compliance with ambient concentration limits.

Table 2-1. AERMOD and Pre-Processor Module Versions

Model/Module	Version
AERMOD	AERMOD version 24142 will be used for the dispersion modeling analysis.
AERMAP	Elevations will be assigned to receptors using AERMAP version 24142 and data from the 1/3 arc-second National Elevation Dataset (NED). Elevations for the buildings and sources will be set to the proposed grade elevation.
AERMET	Not applicable. MRS is requesting the use of representative pre-processed meteorological data provided by KDAQ.
AERSURFACE	Not applicable. MRS is requesting the use of representative pre-processed meteorological data provided by KDAQ.
AERMINUTE	Not applicable. MRS is requesting the use of representative pre-processed meteorological data provided by KDAQ.
BPIP	Downwash parameters will be assigned to point sources using BPIP version 04274. All building heights and locations will be provided in the PSD application.

2.2 Model Selection

The U.S. EPA American Meteorological Society / Environmental Protection Agency Regulatory Model (AERMOD) model includes a state-of-the-science downwash algorithm and utilizes AERMET, a meteorological data preprocessor that utilizes current planetary boundary layer theory to calculate dispersion coefficients. The most current version of the AERMOD model released on November 20, 2024 (version 24142) will be used in conducting the modeling analysis.

The modeling will be performed using the regulatory default option, which includes:

- Stack-tip downwash; and
- A routine for processing averages when calm wind conditions occur or when meteorological data is missing

2.3 Meteorological Data

EPA modeling guidance allows the use of five years of off-site meteorological data or at least one year of on-site meteorological data. FWNA is requesting the use of representative meteorological data pre-processed by KDAQ and made available through KDAQ's website (Bowling Green data is applicable for Simpson County). The data is currently available for years 2020 through 2024.

2.4 Building Wake Effects

The emission sources considered in this analysis will be evaluated in terms of their proximity to nearby structures. The purpose of this evaluation is to determine if stack discharge might become caught in the turbulent wakes of these structures. Wind blowing around a building creates zones of turbulence that are greater than if the building was absent. Plumes entrained in the zones of turbulence experience enhanced plume growth and restricted plume rise. AERMOD incorporates the Plume Rise Model Enhancements (PRIME) algorithms using dimensions from the EPA's Building Profile Input Program (BPIP) for estimating for plumes affected by building wakes. The site layout will be used to digitize buildings and structures to be included in the downwash analysis.

Direction-specific building dimensions and the dominant downwash structure parameters will be determined using the BREEZE® BPIP software. This software incorporates the algorithms of the U.S. EPA-sanctioned Building Profile Input Program with PRIME enhancement (BPIP-PRIME).

2.5 Model Terrain

The terrain elevation for each modeled receptor, building, and source will be determined using the USGS National Elevation Dataset (NED).

The terrain height for each modeled receptor will be calculated using the AERMOD terrain processor (AERMAP version 24142). In addition to terrain elevation, an additional parameter called the hill height scale is required for each receptor to execute AERMOD's terrain modeling algorithms. AERMOD computes the impact at a receptor as a weighted interpolation between horizontal and terrain-following states using a critical dividing streamline approach. This scheme assumes that part of the plume mass will have enough energy to ascend and traverse over a terrain feature and the remainder will impinge and traverse around a terrain feature under certain meteorological conditions. The hill height scale will be computed by the AERMAP terrain preprocessor for each receptor as a measure of the one terrain feature in the modeling domain that would have the greatest effect on plume behavior at that receptor.

The hill height scale does not represent the critical dividing streamline height itself, but supplies the computational algorithms with an indication of the relative relief within the modeling domain for the determination of the critical dividing streamline height for each hour of meteorological data.

According to Section 2.2.1 of the AERMOD Users Guide, the NED array boundary for AERMAP must include all terrain features that exceed a 10 percent elevation slope from any given receptor to properly calculate the hill height scale at each receptor. The domain for the hill height analysis will be set to the minimum coverage required for proper handling of elevation slope (an automated feature within the Breeze AERMOD software).

2.6 Urban/Rural Determination

As with the initial construction modeling, the facility remains located in a predominantly rural area. Therefore, rural settings will be selected in AERMOD.

2.7 Receptors

The same Cartesian receptor grid spacing [using UTM WGS84 coordinate system] in the i**nitial construction demonstration** will be used for the SMC and SIA model runs including:

- receptors spaced at 100 meter intervals along the fenceline;
- receptors spaced at 100-meter intervals extending approximately 4 km from the center of the facility.
- Receptors spaced at 500 meter extending from 4 km to 10 km from the center of the facility;
- If necessary, receptors spaced 1,000 meters extruding from 10 km to 50 km from the center of the facility.

The results of the SIA modeling, demonstrating the extents of the Significant Impact Area, will determine the size of the Cartesian receptor grid (with 100-meter spacing) surrounding the facility to be used for PSD Increment and NAAQS modeling analyses. Locations of off-site background sources and Class I Area(s) will determine the locations of additional receptors.

2.8 Non-Default Options

FWNA is not requesting the use of any non-regulatory default options in AERMOD.

Section 3
Modeling Methodology

3.1 Introduction

For pollutants that exceed PSD significant emission levels, the modeling analysis is performed in the following two step process:

Step 1 – A significant impact analysis, and if required;
Step 2 – A full impact analysis.

3.2 Significant Impact Analysis

In the Significant Impact Analysis, only project sources will be modeled to determine if the proposed emission changes have a significant impact on the surrounding areas. The maximum modeled concentrations from the significant impact analysis will be compared to the applicable significant impact levels (SILs), for each pollutant and averaging period. If the maximum modeled concentration is less than the SIL, no further analysis is required to demonstrate compliance with the NAAQS or PSD Increment. If the maximum modeled concentration exceeds the applicable SIL, a full impact analysis will be completed. Based on the prior application modeling results, it is anticipated that a full impact analysis will be required for PM_{10} and $PM_{2.5}$ emissions.

Table 3-1 summarizes the applicable SILs for each pollutant that will be modeled and identifies the AERMOD output option that will be used to evaluate each pollutant's SIL.

3.3 Significant Impact Area

Assuming at least one pollutant exceeds the SIL, the Significant Impact Analysis conducted above establishes the Significant Impact Area (SIA). The project's SIA is determined as the geographical area that the required air quality analyses for NAAQS and PSD increment air dispersion modeling will be conducted.

This area is defined to include all locations where the modeled potential emissions from the new sources are determined to be above the SIL, and for modeling purposes is treated as a radius around the facility to the most distant receptor exceeding the SIL, as a worst-case (largest) SIA for all pollutants and averaging periods, and described further as follows:

- For NAAQS with annual or 24-hour averages, the SIA is defined as the circular area from the radius from the source to either the most distant point where the model estimates a SIL will be exceeded or 50 kilometers, whichever is less. As discussed below, sources outside the SIA but inside the 50 kilometers will be screened using a 20D approach to determine if their impact is significant to the project.
- For NAAQS with shorter duration, such as for CO (which is not expected to exceed the SIL), a SIA will be similar to the above but not shorter than 10 kilometers.

Table 3-1. Applicable Modeling Levels, Concentrations, Standards and PSD Increments

Pollutant	Averaging Period	Significant Monitoring Concentration[a] ($\mu g/m^3$)	AERMOD SMC Output Option	Class I SIL[e] ($\mu g/m^3$)	Class II SIL ($\mu g/m^3$)	AERMOD SIL Output Option	Primary NAAQS ($\mu g/m3$)	AERMOD NAAQS Output Option	PSD Class I Increment[f] ($\mu g/m^3$)	PSD Class II Increment[f] ($\mu g/m^3$)	AERMOD PSD Increment Output Option
PM_{10}	24-hour	10	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	-	5[h]	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	150	H6H for all 5-years (together), 1 run (5 years), Single highest H6H value	8	30	H2H for each 1-year, 5 separate runs (years), Maximum of
	Annual	NA	NA	-	1[h]	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	Revoked[c]	-	4	17	H1H for all 5-years (together), 1 run (5 years),
$PM_{2.5}$	24-hour	4[d]	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	0.07	1.2[e]	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	35	H8H for each 1-year, 5 separate runs (years), Average together the highest H8H values (5 values, 1 for each year) (or	2	9	H2H for each 1-year, 5 separate runs (years), Maximum of
	Annual	NA	NA	0.06	0.3[e,g]	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	9	H1H for each 1-year, 5 separate runs (years), Average together the highest H1H values (5 values, 1 for each year)	1	4	H1H for all 5-years (together), 1 run (5 years),
CO[f]	1-hour	NA	NA	-	2000[h]	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	40000 (35 ppm)	H2H for each 1-year, 5 separate runs (years), Maximum of the highest H2H values (5 values, 1 for each year)	-	-	-
	8-hour	575	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	-	500[h]	H1H for all 5-years (together), 1 run (5 years), Single highest H1H value	10000 (9 ppm)	H2H for each 1-year, 5 separate runs (years), Maximum of the highest H2H values (5 values, 1 for each year)	-	-	-

[a]401 KAR 51:017 Section 7(5)(a) and 40 CFR 52.21(i)(5)(i). See footnote d

[b]NTBE=Not to be exceeded

[c]Primary and secondary annual PM_{10} NAAQS of 50 µg/m3 was revoked effective 12/18/2006 [71 FR 6114].

[d]$PM_{2.5}$ SMC determined not authorized by CAA (court decision June 23, 2016), but EPA retains the argument that value can be used as part of an overall monitoring assessment

[e]401 KAR 51:017 Section 9(2). See footnote g.

[f]401 KAR 51:017 Section 2(1)

[g]USEPA document "Guidance on SIL for Ozone and Fine Particles in PSD Permitting Program" (4/17/2018) identifies annual $PM_{2.5}$ Class II SIL value of 0.2 $\mu g/m^3$

[h]40 CFR 51.165(b)

The SIA is used for the full Impact analysis (both NAAQS and PSD increment) as well as a guide to identify other sources and facilities that will be included in the air dispersion modeling. Because compliance with the previous Air Permit has not been completely demonstrated and considering the limited emission increase identified in Section 1. The states of Kentucky and Tennessee will be contacted to identify off-site sources that should be evaluated as part of the modeling analysis.

3.4 Full Impact Analysis

For pollutants with maximum modeled concentration that exceed the applicable SIL, a full impact analysis will be completed. The full impact analysis considers post-project "facility-wide" emissions including non-project emission sources. A full impact analysis will be conducted for the significant impact area (SIA) as defined as a radius around the facility to the most distant receptor exceeding the SIL for each pollutant and averaging period, as discussed above.

Given the previous air dispersion modeling, it is anticipated a full impact analysis will be required for PM_{10} and $PM_{2.5}$ and the analysis is outlined below. Should a full impact analysis be required for CO, a similar approach will be used.

3.4.1 PM_{10} and $PM_{2.5}$ NAAQS Modeling Inventory

For PM_{10} and $PM_{2.5}$, the NAAQS demonstration will consider facility-wide emissions as well as off-site emissions. As discussed, the off-site PM_{10} and $PM_{2.5}$ emissions will consider permitted major sources within the SIA as identified in the original permit application.

Permitted sources located outside the SIA and within the annular area extending 50 km from the source will also be included if they have a potential to affect air quality near the source. This determination was made in the original application by using the '20D' approach, to eliminate the majority of regional facilities from the PSD NAAQS modeling analysis that would not be expected to have a significant impact on analysis results. Under this approach, an off-site source is excluded if its potential allowable emissions (Q) in tons/yr is less than 20 times the distance in kilometers ("20D") between it and the facility.

NAAQS values and AERMOD output options for determining compliance are provided in Table 3-1.

3.4.2 PM_{10} and $PM_{2.5}$ Increment Inventory

The increment inventory to be considered in the modeling analysis will include any new increment-consuming sources located within the SIA.

The "baseline concentration" is the existing concentration at the time of the first "complete" application submittal in an area. The emissions that start after that date add to the consumption of the increment.
The types of stationary point sources within the SIA that would be reviewed to determine the need to include them in the increment inventory fall under two specific periods identified below:

Major Source Baseline Date
The "major source baseline date" is defined by statute or implementing regulation. The "major source baseline dates" are January 6, 1975 and October 10, 2010, for PM_{10} and $PM_{2.5}$, respectively. After the "major source baseline date" the following sources will be reviewed to determine the need to including them in the increment inventory:

- New major stationary sources, including the original applicant; and
- Existing major stationary sources undergoing modifications.

At the time of submittal of the previous application no major sources were identified in the SIA.

Minor Source Baseline Date
The "trigger date" is the date established by EPA, after which the minor source baseline date may be established. The "trigger dates" are August 7, 1977 and October 20, 2011 for PM_{10} and $PM_{2.5}$, respectively. Following the trigger date, the "minor source baseline date" is established after which a "complete" PSD application starts the counting of changes in minor source emissions. EPA has assumed the "minor source baseline date" is equivalent to the "trigger date." Therefore, since the "minor source baseline date" has passed, after submittal of the initial "complete" PSD permit application, the following sources will be reviewed to determine the need to including them in the increment inventory:

- Existing stationary sources having undergone a physical change or change in their method of operation; as well as
- Existing stationary sources having increased hours of operation or capacity utilization (unless such change was considered representative of baseline operating conditions).

As no other "complete" PSD permit application had been submitted prior to the initial FWNA permit application, providing this application is revising the previous application, and the fact the facility has not demonstrated initial compliance with PM_{10} and $PM_{2.5}$ emission limits contained in the subsequently issued Air Permit, the requirement to include sources beyond the "minor source baseline date" is not yet applicable.

PSD Class II Increment values and the AERMOD output option for determining compliance with those values are identified in Table 3-1.

3.5 Pre-Construction Monitoring Analysis

As part of a PSD modeling analysis, a pre-construction monitoring analysis must be performed to determine whether preconstruction monitoring may be required to evaluate existing air quality before the permit is issued. The U.S. EPA's Significant Monitoring Concentrations (SMC) establish the levels at which a facility may need to conduct pre-construction ambient air quality monitoring for pollutants subject to PSD review in order to evaluate the existing air quality.

Note that since the emission increases exceed PSD thresholds for PM_{10} and $PM_{2.5}$ [CO is likely excluded as a result of concentrations less than the respective SIL], a pre-construction monitoring analysis will only be conducted for these pollutants.

Table 3-1 provides the AERMOD output options that will be used to assess whether the SMCs values are exceeded. FWNA will compare the applicable pollutant-averaging period maximum model concentration result from the significant impact analysis to these SMCs. If the SMCs are not exceeded, then no pre-construction monitoring could be required.

Similar to the previous application, it is anticipated that the maximum modeled PM_{10} and $PM_{2.5}$ concentrations will exceed the SMC. As a result, a letter will be submitted to DAQ requesting a pre-construction monitoring waiver for those pollutants and any pollutant that exceed the SMC.

3.6 Background Concentrations

A "representative" background concentration is required for each modeled pollutant and averaging period to complete the NAAQS modeling analysis. In this modeling analysis it is anticipated that only NAAQS modeling for 24-hour PM_{10} and both 24-hour and annual $PM_{2.5}$ averaging periods will be required.

The purpose of representative background monitoring concentrations is to account for concentrations that are not attributed to the source or site being evaluated and not explicitly modeled in the air dispersion modeling analysis. The background concentration is to account for other emission sources such as natural sources, nearby sources other than the sources under consideration.

As part of the KDAQ response to the waiver request, FWNA was assigned the responsibilities of providing sufficient justification of a representative background monitoring location that fulfills the requirements of 401 KAR 51:017 and 40 CFR Part 51, Appendix W.

Per Section 8.3 of Appendix W, when determining background concentrations, the following should be considered:

- Background should not include the ambient impact of the project source or other nearby sources that are accounted for in the modeling;
- Ambient concentrations from natural sources in the area are typically accounted for in the background concentration.
- The dataset should be of sufficient completeness and follow appropriate data validation procedures.

The prior permit application used regional modeling inventory information compiled by determining all sources from the KDAQ and TDEC inventories located within a 50 km radius of the FWNA facility. As provided for in the air dispersion modeling protocol, EPA's 20D rule was used as a screening technique to allow the elimination of any sources where emissions (in tpy) are less than 20 times the distance from the source. Prior to applying the "20D Rule" various emission sources at a single facility were combined. Tables 3-2 and 3-3 list the remaining $PM_{2.5}$ and PM_{10} sources, respectively. All locations expected to produce an ambient impact are within 3 km of the site excluding Perdue Agribusiness which is approximately 8 km from the facility's center and all facilities are to the south and south-southwest excluding the Franklin Quarry facility which is directly North.

Table 3-2. Offsite Source of PM2.5 Emissions for Cumulative Modeling Analysis

Facility ID	AI ID	Facility Name	County	Easting	Northing	Distance from Site Center (km)	Direction from Site
2121300005	3974	Hanson Aggregates Midwest LLC - Franklin Quarry	Warren	539712	4074966	2	N
2121300032	39901	Brite Metals Inc	Simpson	538406	4070474	2.40	SSW
2121300059	107116	RKW North America Inc	Simpson	539430	4071698	1	SSW

Table 3-3. Offsite Sources of PM10 Emissions for Cumulative Modeling Analysis

Facility ID	AI ID	Facility Name	County	Easting	Northing	Distance from Site Center (km)	Direction from Site
2121300032	39901	Brite Metals Inc	Simpson	538406	4070474	2.40	SSW
2121300018	39912	Perdue AgriBusiness LLC	Simpson	537901	4064299	8	SSW
2121300051	82781	Vermont Thread Gage LLC	Simpson	539633	4072205	0	SSW
2121300059	107116	RKW North America Inc	Simpson	539430	4071698	1	SSW
2121300005	3974	Hanson Aggregates Midwest LLC - Franklin Quarry	Warren	539712	4074966	2	N

$PM_{2.5}$ Background Concentration Determination

The nearest $PM_{2.5}$ monitor is located at 226 Sunset Street, Smiths Grove, Bowling Green, Kentucky (Smiths Grove - AQS Site ID 21-227-0009) approximately 32 km northwest of FWNA. This monitor was used in the 2016 and 2022 permit applications. The monitoring location is classified by USEPA as being "Residential," but the location is near a heavily populated and traveled area which would likely bias the background concentrations high.

The resulting background concentration from the Bowling Green monitor is provided in Table 3-4.

Table 3-4. PM2.5 Background Concentrations - Bowling Green, KY Monitor AQS-ID: 21-227-0009

	Averaging Period	
Year	Annual Mean Concentration ($\mu g/m^3$)	24-Hour 98th Percentile ($\mu g/m^3$)
2022	6.3	14.7
2023	8.0	25.6
2024	6.3	13.4
Average	**6.9**	**17.9**

PM_{10} Background Concentration Determination

The PM_{10} background monitoring location used for the Franklin, Kentucky site in the 2016 permit application was from the Nashville Monitor (AQS ID: 47-037-0024) active 2000 through 2016 located at 56th Avenue and Louisiana Streets in Nashville, TN. The 2022 permit application used the nearest PM_{10} monitor located at 105 South 17th Street, Nashville, TN (Davidson County) at the Lockland School (Lockeland Monitor – AQS Site ID 47-037-223).

The Lockeland Monitor was concerning for several reasons. It is labeled "Industrial," which often suggests influence by nearby point or area sources. Franklin's terrain and zoning is more rural-industrial mix — not urban-core like East Nashville.

To identify a better alternative that aligns with EPA guidance, an evaluation of the Lockeland Monitor and other proximal monitors is provided in Table 3-5. Preferably the representative wind orientation would be upwind or crosswind, similar land use to the modeling site, high data completeness, ideally be rural.

Table 3-5. PM10 Ambient Air Monitoring Station Comparison

Monitoring Location	AQS ID	Distance to FWNA (km)	Elevation (m)	Wind Orientation	Data Completeness	Rural or Urban	Land Use Similarities	Terrain	Notes
FWNA			198			Rural	Ag, Rural Res., Ind. Parks	Gently rolling	
Nashville, TN	47-037-0023	72	160	Upwind/Crosswind	High	Urban	Moderate	Moderate	Closest; reasonably aligned
Evansville, IN	18-163-0021	160	116	Crosswind	High	Urban	High	High	Good terrrian and land use match
Louisville, KY	21-111-1041	175	137	Downwind	High	Urban	Moderate	Moderate	Less ideal wind orienttations
Jeffersonville, IN	18-019-0010	200	107	Downwind	Medium	Urban	Moderate	Moderate	Weak data completeness; Less Ideal wind orientation
Lexington, KY	21-067-0012	300	302	Downwind	Medium	Urban	Low	High	Far; Land use mismatch
Memphis, TN	47-157-0024	370	83	Upwind/Crosswind	Medium	Urban	Low	Low	Too far for regional reprsentativness
Knoxville, TN	47-093-1013	260	277	Crosswind	Excellent	Urban	Moderate	Low	Higher elevation, more variable land use

Evansville, IN monitoring location better meets the established criteria due to the following:

- Crosswind orientation that minimizes source influence while reflecting regional background conditions
- Land use compatibility including agricultural and light industrial areas on the county periphery, similar to the FWNA facility
- Terrain and elevation reasonably consistent with Simpson County (~116 m vs ~198 m)
- High data completeness (≥98%) across multiple years ensuring robust background estimation
- Monitor classified as urban, but with peripheral conditions aligning more closely to rural Simpson County

To develop background concentrations, monitoring values were downloaded from EPA AirData Air Quality Monitors database for the Evansville, Indiana site. Using calendar years 2022-2024, the resulting background concentration for the 24-hour PM_{10} standard is 60 µg/m^3 (significantly higher than the 35.67 µg/m^3 used in the previous application) as provided in Table 3-6.

Table 3-6. PM10 Background Concentrations – Evansville, IN Monitor (AQS ID: 18-163-0021)

Year	Second High 24-Hour Concentration (µg/m3)
2022	81
2023	53
2024	46
Average	**60**

3.7 Class I Area Impact Assessment

The current Federal Land Manager (FLM) policies, as outlined in the FLAG document (2010 Federal Land Air Guidance) state that any Class I areas within 300 km of the proposed source as well as any other Class I areas that may be potentially affected should be identified and evaluated for potential air quality impacts on those Class I areas.

Class I areas are federally protected areas for which more stringent air quality standards apply. "Class I" areas are generally defined as federal lands such as national parks (NP), national wilderness areas, and national monuments. There are five (5) Class I areas within 300 km of the facility location.

Typically, Class I area assessments are conducted in the following two ways: PSD increment consumption and AQRV (typically visibility and deposition).

A list of these Class I areas and their approximate distance from the facility is provided in Table 3-8.

Table 3-7. Distance to Class I Areas within 300 km of Fritz Winter

Site/Class I Area	UTM Cooridnates		Shortest Distance to Fritz Winter (km)
	East (km)	North (km)	
Fritz Winter	539.82	4072.44	-
Mammoth Cave National Park	574.61	4109.48	51
Great Smoky Mountains National Park	774.92	3943.98	268
Joyce Kimer-Slickrock Wilderness	771.57	3928.7	273
Sipsey Wilderness	467.42	3798.71	283
Cohutta Wilderness	716.4	3874.22	265

3.7.1 Class I Area AQRV PSD Analysis

The Federal Land Managers (FLM) have the authority to protect Air Quality Related Values (AQRVs), and to consider in consultation with the permitting authority whether a proposed major source or modification will have an adverse impact on such values. AQRVs for which PSD modeling evaluations is typically conducted include visibility and deposition of sulfur and nitrogen.

Historically, Class I Area AQRV analyses were developed based on the distance between a PSD project and a Class I Area. The distance threshold has been 300+ km depending on the magnitude of emissions for a project and regulatory agency discretion.

In October 2010, The Federal Land Managers Air Quality Related Values (AQRV) Workgroup (FLAG) Phase I Report – Revised (2010) was issued providing guidance which established a threshold ratio of emissions to distance, which AQRV review is not required. Specifically, if the sum of SO_2, NO_x, PM_{10} and H_2SO_4 emissions (Q, in tpy) divided by distance (d, in km) is less than 10, no AQRV analysis is required.

Based upon the distance to the nearest Class I area to the project, as with the previous applications, FWNA proposes to use the Q/D screening criteria in the Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report to demonstrate that the project will have no significant impacts on any Class I air quality related value (AQRV), including visibility.

Similar to the initial project it is assumed that no value will exceed 10 and the facility will not be subject to AQRV review.

3.7.2 Class I Area PSD Increment Analysis

Provided all the Class I areas are located more than 50 km from the facility the following approach will be used:

AERMOD will be used to determine concentrations at the boundary of the model by placing receptors as follows for each of the six (6) Class I Areas identified in Table 3 9: in 3 rows of arcs, at 48 km, 49 km, and 50 km from the facility, with each arc spanning 10 degrees of the circumference (5 degrees each direction from the straight line between the site and the Class I Area), with spacing of 100 meters between receptors in each arc.

Given the results of the previous permit application presented in Table 3-9 below, it is anticipated that concentrations will be less than the Class I Area SILs.

Provided the concentrations are less than the Class I Area SILs at 50 km, it is assumed that concentrations at distances beyond 50 km will continue to decrease. Based on this review it would be determined that no Class I areas will be negatively impacted per Section 4.2 of the Guideline on Air Quality Models.[1]

3.7.3 Modeling for Visibility

Similar to Section 3.7.1, the protocol proposes to use the Q/D screening criteria in the Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report to demonstrate that the project will have no significant impacts on visibility.

[1] USEPA, Guideline on Air Quality Models, 40 CFR, Part 51, Appendix W, FR, Vol. 82, No. 19, Section 4.2

Table 3-8. Class I Maximum Impact Compared to Class I SIL (2016 Application)

Pollutant	Averaging Period	Significant Impact Level µg/m^3	Class I Area Maximum Impact in µg/m^3				
			Mammoth Cave	Great Smokey Mountains	Joyce Kilmer-Slickrock	Cohutta	Sipsey
$PM_{2.5}$	Annual	0.06	0.00516	0.000116	0.0000935	0.000125	0.0000884
	24 hr	0.07	0.0606	0.00246	0.00179	0.00258	0.00206
PM_{10}	Annual	0.16	0.00625	0.0000568	0.0000471	0.0000603	0.0000464
	24 hr	0.32	0.0951	0.00216	0.00174	0.00161	0.00173

3.8 Modeled Emission Rates for Precursors (MERPs)

On November 13, 2024 Kentucky Division for Air Quality released a document entitled "Guidance on the Use of EPA's Modeled Emission Rates for Precursors (MERPs) for Secondary Pollutant Formation in Kentucky PSD Projects." This 2024 Guidance update the 2018 document entitled "Application of the EPA's Modeled Emission Rates for Precursors (MERPS) for Secondary Pollutant Formation in Kentucky" following release of the April 30, 2024, the US Environmental Protection Agency (EPA) a memorandum updating the primary annual $PM_{2.5}$ significant impact level (SIL), while retaining the 2018 Ozone and $PM_{2.5}$ 24-hour SILs[1].

The change in the primary annual $PM_{2.5}$ SIL came in response to a change in the primary annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS) from 12.0 µg/m$_3$ to 9.0 µg/m$_3$, which went into effect on May 6, 2024. The EPA released an additional memorandum[2] on April 30, 2024, providing clarifying information on the development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 demonstration tool for ozone and $PM_{2.5}$ under the PSD permitting program to account for changes in the recommended $PM_{2.5}$ SIL values.

The Kentucky DAQ 2024 Guidance will be followed for the evaluation of both $PM_{2.5}$ and ozone as required. The Table 3 Default MERP values for Kentucky PSD Applications will be used.

3.8.1 Secondary Formation of $PM_{2.5}$

The 2024 Guidance presents a multitiered screening analysis based on facility wide emission rates of NO_x, SO_2 and $PM_{2.5}$ emissions.

It is anticipated that a cumulative analysis will be required for $PM_{2.5}$. As stated above, the current project direction is to use the Table 3 Default MERP Values when conducting the cumulative analysis.

3.8.2 Secondary Formation of Ozone

Potential emissions of NO_2 are below the significant emission rate of 40 tpy; however, potential VOC emissions from the project will be above the significant emission rate of 40 tpy. VOC is considered a precursor for secondary formation of ground-level (tropospheric) ozone. Therefore, an assessment of the potential impact on ambient ozone air quality in the area is required.

For ozone, the tiered approach will again be used. Given the facility's emission rate of NO_x and VOC, a cumulative analysis will likely be unnecessary.

Simpson County is currently designated as attainment for ozone. Simpson and the surrounding counties are rural with relatively few industrial sources and have low background concentrations of ozone as compared to other areas of the state. Given that secondary formation of ozone is more of a long-range transport issue, precursor VOC emissions from the project are not expected to have significant impacts to ambient air quality or to cause or significantly contribute to a violation of the ozone NAAQS.

3.9 Air Toxics

The project includes emissions of certain compounds that may be identified as "potentially hazardous matter or toxic substances." To demonstrate FWNA will comply with 401 KAR 63:020 that regulates potential hazardous matter or toxics substances (i.e., toxic air pollutants – TAPs) and in order to evaluate whether these toxic compounds are in sufficient concentration that they could present a health hazard, air dispersion modeling will be conducted.

The same meteorological data and stack conditions described elsewhere will be used to determine maximum annual ground level concentrations of each TAP. The maximum concentration of all the receptors will be compared to the concentrations listed as having a significant health threat in EPA Region IX "Regional Screening Level (RSL) Resident Ambient Air Table (TR=1E-6, THQ=1) November 2024". The concentrations in that table were derived for chemical exposures around waste storage sites and are considered very conservative.

3.10 Additional Impact Analysis

The results of the air dispersion modeling analysis will be used in the project's additional impact analyses to assist in assessing impacts related to growth, adverse effects on soil & vegetation, and visibility impairment.

Section 4
Emission and Stack Characterization

4.1 Emissions Modeled

In the modeling analysis for the NAAQS and PSD increment demonstrations, the worst-case emissions for site-wide sources will be modeled. Potential hourly emission rates will be used to develop 24-hour and annual emission rates.

4.2 Stack Parameters

Table 4-1 contains a summary of the facility stack parameters that will be modeled. The facility does not operate any other emission sources. The emission sources will be modeled as point sources with the identified Stack Parameters.

Table 4-1. Modeled Emission Sources and Stack Parameters

Stack ID	Stack Location		Stack Height		Stack Diameter		Stack Temperature		Stack Velocity			Air Volume (cfm)	Stack Orientation Vertical Unobstructed (V) Vertical Obstructed (VO) Horizontal (H)
	X Coord (m)	Y Coord (m)	(m)	(ft)	(m)	. (ft)	(°K)	(°F)	(m/s)	(fps)	(fpm)		
ST02	539906.00	4072425.00	35	115	2.54	8.33	305.4	90.0	14.902	48.892	2934	160,000	V
ST03	539903.00	4072413.00	17	56	0.30	1.00	294.3	70.0	3.881	12.732	764	600	H
ST04	539904.00	4072404.00	22	72	0.30	1.00	294.3	70.0	3.881	12.732	764	600	H
ST05	539906.00	4072407.00	22	72	0.30	1.00	294.3	70.0	3.881	12.732	764	600	H
ST06	539908.00	4072411.00	22	72	0.30	1.00	294.3	70.0	3.881	12.732	764	600	H
ST07	539888.00	4072396.00	40	131	2.03	6.67	302.6	85.0	15.281	50.134	3008	105,000	V
ST08	539822.00	4072517.00	26	85	0.97	3.17	299.8	80.0	4.838	15.871	952	7,500	V
ST09	539816.00	4072488.00	43	141	1.97	6.46	305.4	90.0	17.833	58.508	3510	115,000	V
ST12	539832.00	4072331.00	30	98	1.52	5.00	299.8	80.0	16.817	55.174	3310	65,000	V
ST13	539899.00	4072407.00	17	56	0.30	1.00	294.3	70.0	3.881	12.732	764	600	H
ST15A	539708.00	4072441.00	14	47	0.41	1.33	305.4	90.0	10.005	32.826	1970	2,750	VO
ST15B	539704.00	4072435.00	14	47	0.41	1.35	305.4	90.0	12.345	40.503	2430	3,500	VO
ST16	539698.00	4072424.00	14	46	0.98	3.23	305.4	90.0	12.593	41.317	2479	20,310	V

Craig Schmeisser

From: Davis, Kevin D (EEC) <Kevin.Davis@ky.gov>
Sent: Wednesday, August 20, 2025 1:30 PM
To: Craig Schmeisser
Subject: Fritz Winter North American PSD protocol comments

Craig,

Please find below comments pertaining to the Fritz Winter North American PSD protocol. If you have already addressed these comments in the upcoming modeling submittal, then no response is required.

Section 3.2 - Significant Impact Analysis

• This section of the modeling protocol states that in the Significant Impact Analysis (SIA), only project sources will be modeled to determine if the proposed emission changes have a significant impact on the surrounding areas. The final modeling report should document the basis for the emission rates used in the SIA modeling.

• Table 3-1 summarizes the applicable SILs for each pollutant that will be utilized in the modeling. The SIL listed in Table 3-1 for the annual PM2.5 NAAQS is 0.3 µg/m3 . On March 6, 2024, the EPA finalized revisions (see 89 FR 16202, March 6, 2024) to the primary annual PM2.5 standard by lowering the level from 12.0 µg/m3 to 9.0 µg/m3. Considering the new level of the primary annual PM2.5 NAAQS, the EPA has determined a new SIL based on an updated technical analysis and new NAAQS level. For the revised primary annual PM2.5 NAAQS, the EPA recommends a SIL value of 0.13 µg/m3 in the April 30, 2024, EPA memo "Supplement to the Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program". Therefore, the EPA Region 4 recommends that the SIL modeling for annual PM2.5 use a concentration of 0.13 µg/m3

• The SIL listed in Table 3-1 for the Class I annual PM2.5 increment is 0.06 µg/m3. On March 6, 2024, the EPA finalized revisions (see 89 FR 16202, March 6, 2024) to the primary annual PM2.5 standard by lowering the level from 12.0 µg/m3 to 9.0 µg/m3. In EPA's 2018 guidance, the SIL values for the PM2.5 PSD increments were derived from the recommended NAAQS SIL values. Considering the revised level of the primary annual PM2.5 NAAQS and the associated SIL, the SIL values for PSD increments have also been updated to reflect these changes. For the annual Class I PM2.5 PSD increment, the EPA recommends a SIL value of 0.03 µg/m3 in the April 30, 2024, EPA memo "Supplement to the Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program". Therefore, the EPA Region 4 recommends that the SIL modeling for the annual PM2.5 Class I increment use a concentration of 0.03 µg/m3

Section 3.4.2 - PM10 and PM2.5 Increment Inventory

• The cumulative PM2.5 increment consumption analysis, if required, should account for both the direct and the secondary component of PM2.5 increment consumption from direct PM2.5 emissions and precursor SO2 and NOx emissions from any nearby PM2.5 increment sources. Section V.3.2 of the July 29, 2022, EPA "Guidance for Ozone and Fine Particulate Matter Permit Modeling" describes the key components of a cumulative PM2.5 increment analysis:

1. Direct and precursor allowable emissions from the proposed new sources;
2. Direct and precursor actual emissions changes that have occurred at existing sources since the minor source baseline date for the proposed source's baseline area;
3. Direct and precursor actual emissions from any major stationary source on which construction commenced after October 20, 2010 (major source baseline date for PM2.5); and

4. Direct and precursor allowable emissions of permitted sources that are not yet fully operative, if applicable.

Section 3.7.2 - Class I Area PSD Increment Analysis

• This section of the modeling protocol indicates that modeling with AERMOD will be performed by placing arcs of receptors at distances of 48 km, 49 km and 50 km in the direction of each Class I area within 300 km, to demonstrate that impacts are below the Class I SILs. Although EPA Region 4 has not historically negatively commented when receptors in the direction of the relevant Class I Area are used for Class I SIL modeling using AERMOD, we recommend that a full 360-degree arc of receptors be used as discussed in Section 4.2.c.i of the Guideline on Air Quality Models (40 CFR Part 51, Appendix W).
• The modeling protocol indicates that AERMOD will be used to predict impacts of project-related PM2.5 and PM10 emissions at receptors located ~50 km from the Fritz Winter site. These impacts predicted by AERMOD will be compared to the Class I PM2.5 and PM10 SILs. It should be noted that the sum of primary project-related PM2.5 impacts (from AERMOD at ~50km) and secondary PM2.5 impacts (from project-related SO2 and NOx emissions) should be used for comparison to the Class I PM2.5 SILs. One possible approach for performing this analysis is described beginning at the bottom of page 4 of the Attachment to the April 30, 2024, EPA Memo "Clarification on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program". This part of the memo specifically focuses on the use of distance-based MERPs to calculate secondary PM2.5 impacts from the project at the Class I area.

Please feel free to reach out to me if you have any comments and/or concerns pertaining to this project and comments.

Regards,

Kevin Davis
KY Division for Air Quality
Program Planning Branch
300 Sower Blvd., 2nd Floor
Frankfort, KY 40601
E:kevin.davis@ky.gov
T: 502-782-6593 |M:502-219-2699

Appendix R
Pre-Construction Monitoring Waiver

08497 Plattner Rd | New Bremen, OH 45869 | (614) 425-6392
madriverstrategies.com

mad river strategies llc

July 14, 2025

VIA EMAIL

Michael Kennedy
Director, Division for Air Quality
Kentucky Department for Environmental Protection
300 Sower Boulevard
2nd Floor
Frankfort, KY 40601

Subject: Request for Waiver of Pre-Construction Ambient Air Monitoring Requirements
Fritz Winter North America, LP (Agency Interest No. 129745)
Franklin, Kentucky

Dear Mr. Kennedy:;

Fritz Winter North America, LP (FWNA) is preparing to submit a revised air permit application to reflect changes to the existing PSD/Title V Air Quality Permit V-16-022-R1, originally issued on November 25, 2017. The application pertains to FWNA's gray iron foundry and machining operations located at 1 Fritz Winter Way in Franklin, Simpson County, Kentucky.

Consistent with prior permit applications submitted in 2016, 2017 and 2022, this correspondence formally requests a waiver of the pre-construction site-specific ambient air monitoring requirement under 40 CFR 52.21(m). In lieu of conducting site-specific monitoring, FWNA proposes to use existing ambient air quality data, provided such data meet the requirements outlined in 40 CFR Part 51, Appendix W, Sections 8.3.1 and 8.3.2.

As requested by DAQ staff, the revised permit application will include supporting documentation demonstrating that the selected monitoring sites meet the representativeness criteria specified in the aforementioned sections of Appendix W.

Background

FWNA constructed and operates a gray iron foundry and machining facility authorized under the current Air Permit. The facility primarily produces brake rotors and is located within the Wilkey North Industrial Park in Franklin, approximately 5 miles north of Franklin and 13 miles south of Bowling Green, Kentucky along State Route 31W.

Following initial performance testing required by the Air Permit, certain emission limitations were found to be exceeded. In response, FWNA is preparing a revised permit application that reflects updated emissions data and corresponding permit changes.

Although the revised application is not yet finalized, Table 1 summarizes anticipated changes to potential emissions. The most notable increase is attributed to revised VOC estimates from pouring/cooling and coremaking operations. Reduction in PM and PM_{10} potential emission rates are expected along with an increase in carbon monoxide (CO) emissions.

Similar to the initial application, due to projected CO and VOC emissions exceeding 100 tpy, PSD permitting requirements will be applicable to PM_{10}, $PM_{2.5}$, VOC, and CO.

Table 1. Emission Increase Comparison (2017 versus 2025)

Pollutant	PSD SER (tpy)	2017 Permit Modification		2025 Permit Revision	
		Emissions Increase (tpy)	PSD Permitting Required? (Yes/No)	Emissions Increase (tpy)	PSD Permitting Required? (Yes/No)
Filterable PM	25	43.3	Yes	35.41	Yes
PM_{10}	15	47.3	Yes	35.41	Yes
$PM_{2.5}$	10	30.9	Yes	35.41	Yes
SO_2	40	1.49	No	2.00	No
NO_x	40	28.5	No	15.68	No
VOC	40	79.1	No	208.69	Yes
CO	100	297	Yes	334.98	Yes
Lead	0.6	0.28	No	0.02	No

Table 2 compares the expected revised emission rates and BACT to the same values provided in the current Air Permit. The table shows a decrease in potential emissions of PM and PM_{10} and an increase in $PM_{2.5}$ emissions.

Table 2. PM BACT Comparison (2017 versus 2025)

Control Device (Stack)	CURRENT PERMIT (2017)			2025 PROPOSED LIMITS			Comments on 2025 Proposed Limits
	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$	
CU01 (ST02)	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.001 gr/dscf 1.42 lb/hr 6.20 ton/yr	0.0006 gr/dscf 0.850 lb/hr 3.72 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	0.002 gr/dscf 2.64 lb/hr 11.58 ton/yr	95th Upper CI all tests
CU06 (ST07)	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0025 gr/dscf 2.16 lb/hr 9.46 ton/yr	0.0015 gr/dscf 1.30 lb/hr 5.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	0.0025 gr/dscf 2.21 lb/hr 9.67 ton/yr	95th Upper CI all tests
CU08 (ST09)	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0025 gr/dscf 3.54 lb/hr 15.5 ton/yr	0.0015 gr/dscf 2.12 lb/hr 9.30 ton/yr	0.0005 gr/dscf 0.032 lb/hr 0.141 ton/yr	0.0005 gr/dscf 0.032 lb/hr 0.141 ton/yr	0.0005 gr/dscf 0.032 lb/hr 0.141 ton/yr	Only residual PM from Core Blower; Mixer vented to CU08
CU11 (ST12)	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0025 gr/dscf 1.32 lb/hr 5.78 ton/yr	0.0015 gr/dscf 0.792 lb/hr 3.47 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr	0.001 gr/dscf 0.57 lb/hr 2.51 ton/yr	95th Upper CI all tests

Table 3 compares the expected revised emissions rates and BACT for VOC and CO to the same values provided in the Air Permit.

<u>SILs and SMCs</u>

Generally, when conducting the preliminary analysis during the air quality impacts phase of the project, if modeled emission rates are below the significant impact levels (SILs), no further modeling is required.
Maximum concentrations of CO will be less than both the 8-hour and 1-hour SILs, therefore background concentrations of CO will be unnecessary for the project.

Significant Monitoring Concentrations (SMCs) are levels if not exceeded additional monitoring may not be necessary.

Table 3. VOC and CO BACT Comparison (2017 versus 2025)

Stack or Vent	CURRENT PERMIT (2017)		2025 PROPOSED LIMITS		Comments on 2025 Proposed Limits
	BACT for VOC	BACT for CO	BACT for VOC	BACT for CO	
CU01 ST02	0.14 lb/hr; 0.61 ton/yr	2.11 lb/hr; 9.25 ton/yr	0.176 lb/ton gray iron 6.64 lb/hr; 7.04 ton/yr	2.05 lb/ton gray iron 75.90 lb/hr; 82.00 ton/yr	95th Upper CI all tests
CU06 ST07 (Previously EU53)	0.10 lb/ton gray iron; 4.58 ton/yr	1.00 lb/ton gray iron; 25.3 lb/hr	0.549 lb/ton gray iron 8.24 lb/hr; 21.96 ton/yr	0.478 lb/ton gray iron 0.72 lb/hr; 1.91 ton/yr	95th Upper CI all tests
CU07 ST08	0.70 lb/hr; 1.67 ton/yr	N/A	4.59 lb/ton core sand 11.87 lb/hr; 15.35 ton/yr	N/A	
CU08 ST09	20.8 lb/hr; 39.7 ton/yr	128 lb/hr; 235 ton/yr	3.561 lb/ton gray iron 58.82 lb/hr; 142.428 ton/yr	6.238 lb/ton gray iron 93.49 lb/hr; 250.43 ton/yr	95th Upper CI all tests

Significant Monitoring Concentrations (SMCs) are levels if not exceeded additional monitoring may not be necessary.

As with the previous permit applications, it is expected that PM_{10} and $PM_{2.5}$ will exceed the SILs and SMCs for all applicable averaging periods.

Request

FWNA respectfully requests approval to use federal and/or state-collected ambient air monitoring data to establish background PM_{10} and $PM_{2.5}$ concentrations, consistent with 40 CFR Part 51, Appendix W, and consistent with waivers previously granted for FWNA's 2016 and 2022 permit applications.

This request supports the air quality impact analysis associated with the revised PSD/Title V Air Permit application and seeks a waiver of the pre-construction ambient air monitoring requirement under 40 CFR 52.21(m).

Should you have any questions regarding this request, please contact me at craig.schmeisser@madriverstrategies or 614.425.6392 or Jordan Smith at jordan.smith@fritzwinter.us.

Respectfully submitted,

Craig Schmeisser

Craig S. Schmeisser
Senior Project Consultant

Copy to: Kevin Davis – Kentucky DEP, DAQ (via email)
Curtis Mabry – Fritz Winter North America, LP (via email)
Rick Shewekah – Kentucky DEP, DAQ (via email)
Jordan Smith – Fritz Winter North America, LP (via email)
Amy Tempus-Doom – Kentucky DEP, DAQ (via email)

Appendix S
RKW North America Permit F-24-041

Commonwealth of Kentucky
Energy and Environment Cabinet
Department for Environmental Protection
Division for Air Quality
300 Sower Boulevard, 2nd Floor
Frankfort, Kentucky 40601
(502) 564-3999

Final

AIR QUALITY PERMIT

Issued under 401 KAR 52:030

Permittee Name:	**RKW North America, Inc.**
Mailing Address:	**270 Reasonover Drive, Franklin, KY 42134**
Source Name:	**RKW North America, Inc.**
Mailing Address:	**270 Reasonover Drive Franklin, KY 42134**
Source Location:	**270 Reasonover Drive**
Permit ID:	**F-24-041**
Agency Interest #:	**107116**
Activity ID:	**APE20240001**
Review Type:	**Conditional Major, Operating**
Source ID:	**21-213-00059**
Regional Office:	**Bowling Green Regional Office 2642 Russellville Road Bowling Green, KY 42101 (270) 746-7475**
County:	**Simpson**
Application Complete Date:	**March 25, 2024**
Issuance Date:	**November 15, 2024**
Expiration Date:	**November 15, 2029**

Rick Shewekah

For Michael J. Kennedy, P.E.
Director
Division for Air Quality

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Permit	Permit Type	Activity#	Complete Date	Issuance Date	Summary of Action
F-24-041	Renewal	APE20240001	3/25/2024	11/15/2024	Renewal Operating Permit

SECTION A - PERMIT AUTHORIZATION

Pursuant to a duly submitted application the Kentucky Energy and Environment Cabinet (Cabinet) hereby authorizes the operation of the equipment described herein in accordance with the terms and conditions of this permit. This permit was issued under the provisions of Kentucky Revised Statutes (KRS) Chapter 224 and regulations promulgated pursuant thereto.

The permittee shall not construct, reconstruct, or modify any affected facilities without first submitting a complete application and receiving a permit for the planned activity from the permitting authority, except as provided in this permit or in 401 KAR 52:030, Federally-enforceable permits for non-major sources.

Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits, licenses, or approvals required by the Cabinet or any other federal, state, or local agency.

SECTION B - EMISSION POINTS, EMISSION UNITS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS

Emission Unit 01 (EU01) Flexographic Printer

Description:
Control equipment: Regenerative Thermal Oxidizer #1 (RTO) (EU02) and a Permanent Total Enclosure
Control efficiency: 98.91%
RTO rated capacity: 1.5 MMBtu/hr
Fuel: Natural Gas
Construction Date: April 19, 2014

Emission Unit 06 (EU06) 8-color Flexographic Printer

Description:
Control equipment: RTO #4 (EU11) and a Permanent Total Enclosure
Control efficiency: 98.4%
Printer oven rated capacity: 1.975 MMBtu/hr
RTO rated capacity: 7.5 MMBtu/hr
RTO construction date: August 2022
Fuel: Natural Gas
Construction Date: September 2019

Emission Unit 09 (EU09) 8-color Flexographic Printer

Description:
Control equipment: RTO #4 (EU11) and a Permanent Total Enclosure
Control efficiency: 98.4%
Printer oven rated capacity: 1.975 MMBtu/hr
RTO rated capacity: 7.5 MMBtu/hr
Fuel: Natural Gas
Construction Date: August 2022

APPLICABLE REGULATIONS:
401 KAR 63:020, *Potentially hazardous matter or toxic substances*

1. **Operating Limitations:**
   a. The permittee shall operate the applicable RTO at all times a printer is applying any material that contains VOC. In addition, all emissions from the processes specified above shall be routed to an RTO at all times. [401 KAR 52:030, Section 10]

   b. The average combustion temperature of RTO in any three (3) hour period shall not fall more than 28°C (50°F) below the combustion temperature limit established during the most recent performance test. If the 3-hour average combustion chamber temperature falls more than 28°C (50°F) below the operating temperature limit established for the thermal oxidizer, then the permittee shall assume destruction efficiency of zero, during the time period of the deviation for the purpose of demonstrating compliance with emission limitations. [401 KAR 52:030, Section 10]

SECTION B - EMISSION POINTS, EMISSION UNITS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

c. The permittee shall install, calibrate, maintain and operate in accordance with manufacturer's specifications a temperature monitoring device equipped with a continuous recorder in the firebox of the thermal oxidizer or in the duct immediately downstream of the firebox before any substantial heat exchange occurs. [401 KAR 52:030, Section 10]

d. Pressure differential across a permanent total enclosure shall be at least 0.007 in H_2O (0.013 mm Hg). The direction of airflow through all NDO (Natural Draft Openings) shall be into the enclosure during operation of affected units. [401 KAR 52:030, Section 10]

Compliance Demonstration Method
Refer to **4. Specific Monitoring Requirements**.

2. Emission Limitations:

a. Refer to Section D for the source-wide VOC emission limitation.

b. Persons responsible for a source from which hazardous matter or toxic substances may be emitted shall provide the utmost care and consideration, in the handling of these materials, to the potentially harmful effects of the emissions resulting from such activities. No owner or operator shall allow any affected facility to emit potentially hazardous matter or toxic substances in such quantities or duration as to be harmful to the health and welfare of humans, animals and plants. Evaluation of such facilities as to adequacy of controls and/or procedures and emission potential will be made on an individual basis by the cabinet. [401 KAR 63:020, Section 3]

Compliance Demonstration Method:
Based upon the emission rates of toxics and hazardous air pollutants determined by the Cabinet using information provided in the application and supplemental information submitted by the source, the Cabinet determines the affected facility to be in compliance with 401 KAR 63:020.

3. Testing Requirements:

a. The permittee shall conduct a performance test for each RTO using EPA Reference Method 25A or alternate as approved by the Administrator to determine the control efficiency no later than 5 years following the previous performance test. [401 KAR 52:030, Section 10]

b. The permittee shall use the data collected during the performance test to calculate and record the average combustion temperature maintained during the performance test. This calculated average combustion temperature is the minimum operating set point for the thermal oxidizer. [401 KAR 52:030, Section 10]

4. Specific Monitoring Requirements:

a. The permittee shall monitor the temperature in the firebox of the RTO or immediately downstream of the firebox before any substantial heat exchange occurs. Compliance shall be demonstrated by monitoring and recording the combustion temperature at least once every 15 minutes and by calculating and recording the 3-hour averages. [401 KAR 52:030, Section 10]

SECTION B - EMISSION POINTS, EMISSION UNITS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

b. The permittee shall conduct calibration and validation checks any time the temperature sensor exceeds the manufacturer's specified maximum operating temperature range or install a new temperature sensor. [40 KAR 52:030, Section 10]

c. Average 1-hr pressure differentials shall be calculated at least once every 15 minutes using continuous monitoring data when any affected unit in the enclosure is operating. If the average 1-hr pressure differentials are at least 0.007 in H_2O (0.013 mm Hg) into the enclosure, compliance is demonstrated. [401 KAR 52:030, Section 10]

d. To measure pressure differential between the inside and outside of each enclosure, differential pressure gages with continuous recording systems shall be installed, calibrated, maintained, and operated in accordance with manufacturer's instructions. [401 KAR 52:030, Section 10]

e. The permittee shall monitor the 12-month rolling total VOC emissions monthly. [401 KAR 52:030, Section 10]

5. <u>Specific Recordkeeping Requirements</u>:

a. The permittee shall maintain records of the following information for each thermal oxidizer (RTO): [401 KAR 52:030, Section 10]

1) The design and/or manufacturer's parameter specifications,

2) The operational procedures and preventive maintenance records,

3) The calibration records for the combustion temperature sensor, validation checks and the subsequent accuracy audits,

4) A log of visual inspections of each temperature sensor if redundant temperature sensors are not used,

5) A record of the average combustion chamber temperature limit established during the most recent performance test and all relevant supporting data,

6) The continuously recorded combustion chamber temperature of the thermal oxidizer along with the 3-hour averages,

7) Record all periods (during printing operations), in which the 3-hour average combustion chamber temperature of the thermal oxidizer is mor than 28°C (50°F) below the temperature limit established during the most recent performance test. Each occurrence shall be considered a deviation from permit requirements.

8) During all periods of operation of the thermal oxidizer in which the 3-hour average combustion chamber temperature is more than 28°C (50°F) below the combustion chamber temperature limit established by the most recent performance test, and a daily log of the following information shall be kept:

SECTION B - EMISSION POINTS, EMISSION UNITS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

i. Whether any air emissions were visible from the facilities associated with the thermal oxidizer;

ii. Whether visible emissions were normal for the process;

iii. The cause of the visible emissions; and

iv. Corrective action(s) taken shall be recorded.

b. For each capture system that is a permanent total enclosure, the permittee shall keep data and documentation used to support a determination that the capture system meets the criteria in Method 204 for a permanent total enclosure.

c. The permittee shall maintain monthly records of the amount of natural gas used. [401 KAR 52:030, Section 10]

d. The permittee shall maintain monthly records of all material used containing VOC, including the product type, amount used, and the weight percentage for VOC. [401 KAR 52:030, Section 10]

e. At the end of each month, the permittee shall calculate VOC emissions according to Section D, and every month, a new 12-month rolling total for VOC emissions shall be calculated and recorded. [401 KAR 52:030, Section 10]

6. <u>Specific Reporting Requirements</u>:

a. The permittee shall identify, record, and submit a written report to the Field office for each deviation from the permitted conditions. [401 KAR 52:030, Section 10]

1) For each thermal oxidizer, this is each instance in excess of 3 hours during which the average temperature of the thermal oxidizer remains more than 28^{o}C (50^{o}F) below the limit established during the most recent measurement of oxidizer efficiency,

2) For emissions reporting, treat the materials used during a deviation on a controlled printing operation as if they were used on an uncontrolled printing operation for the time period of the deviation.

b. If no deviations occur during a particular 6-month period, the permittee shall state this in the semi-annual report required by Permit Section F(6) - General Condition. [401 KAR 52:030, Section 10]

c. The permittee shall report the number of gallons of each ink applied, the amount of VOC's contained in the coatings, and the source wide monthly and 12 month rolling total VOC emissions as part of the semiannual reporting as required in Section F (5) & (6). [401 KAR 52:030, Section 10]

7. <u>Specific Control Equipment Operating Conditions</u>:

Refer to Section E.

SECTION B - EMISSION POINTS, EMISSION UNITS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Unit 03 (EU03) Boiler #1

Description:
Rated capacity: 2.14 MMBtu/hr
Fuel: Natural Gas
Construction commenced: 2012

Emission Unit 04 (EU04) Boiler #2

Description:
Rated capacity: 2.14 MMBtu/hr
Fuel: Natural Gas
Construction commenced: 2012

APPLICABLE REGULATIONS:
401 KAR 59:015, *New Indirect Heat Exchangers*

STATE-ORIGIN REQUIREMENTS:
401 KAR 63:020, *Potentially Hazardous Matter or Toxic Substances*

1. **Operating Limitations:**
   During a startup period or shutdown period, the permittee shall comply with the work practice standards established in 401 KAR 59:015, Section 7. [401 KAR 59:015, Section 7]

   a. The permittee shall comply with 401 KAR 50:055, Section 2(5); [401 KAR 59:015, Section 7(1)(a)]

   b. The frequency and duration of startup periods or shutdown periods shall be minimized by the affected facility; [401 KAR 59:015, Section 7(1)(b)]

   c. All reasonable steps shall be taken by the permittee to minimize the impact of emissions on ambient air quality from the affected facility during startup periods and shutdown periods; [401 KAR 59:015, Section 7(1)(c)]

   d. The actions, including duration of the startup period, of the permittee during startup and shutdown periods, shall be documented in signed, contemporaneous logs or other relevant evidence; [401 KAR 59:015, Section 7(1)(d)]

   e. Startups and shutdowns shall be conducted according to either: [401 KAR 59:015, Section 7(1)(e)]

      i. The manufacturer's recommended procedures; or [401 KAR 59:015, Section 7(1)(e)1.]

      ii. Recommended procedures for a unit of similar design, for which manufacturer's recommended procedures are available, as approved by the cabinet based on documentation provided by the permittee. [401 KAR 59:015, Section 7(1)(e)2.]

   Compliance Demonstration Method:
   Compliance shall be demonstrated according to **5. Specific Recordkeeping Requirements**

SECTION B - EMISSION POINTS, EMISSION UNITS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

2. Emission Limitations:

a. The permittee shall not cause emissions of particulate matter in excess of 0.56 lb/MMBtu actual heat input. [401 KAR 59:015, Section 4(1)(a)]

b. The permittee shall not cause emissions of particulate matter in excess of 20 percent opacity, except: [401 KAR 59:015, Section 4(2)]

i. A maximum of 40 percent opacity shall be allowed for a maximum of 6 consecutive minutes in any 60 minutes during fire box cleaning or soot blowing; and [401 KAR 59:015, Section 4(2)(b)]

ii. For emissions from an affected facility caused by building a new fire, emissions during the period required to bring the boiler up to operating conditions shall be allowed, if the method used is recommended by the manufacturer and the time does not exceed the manufacturer's recommendations. [401 KAR 59:015, Section 4(2)(c)]

c. The permittee shall not cause emissions of gases that contain sulfur dioxide in excess of 3.0 lb/MMBtu actual heat input. [401 KAR 59:015, Section 5(1)(a)]

Compliance Demonstration Method:
Compliance with the 401 KAR 59:015 emission standards is assumed. [401 KAR 50:045, Section 4(3)(c)1.]

d. Persons responsible for a source from which hazardous matter or toxic substances may be emitted shall provide the utmost care and consideration, in the handling of these materials, to the potentially harmful effects of the emissions resulting from such activities. No owner or operator shall allow any affected facility to emit potentially hazardous matter or toxic substances in such quantities or duration as to be harmful to the health and welfare of humans, animals and plants. Evaluation of such facilities as to adequacy of controls and/or procedures and emission potential will be made on an individual basis by the cabinet. [401 KAR 63:020, Section 3]

Compliance Demonstration Method:
Based upon the emission rates of toxics and hazardous air pollutants determined by the Cabinet using information provided in the application and supplemental information submitted by the source, the Cabinet determines the affected facility to be in compliance with 401 KAR 63:020.

3. Testing Requirements:
Testing shall be conducted at such times as may be requested by the Cabinet. [401 KAR 50:045, Section 1, and 401 KAR 59:005, Section 2(2)]

4. Specific Monitoring Requirements:

a. The permittee shall monitor the amount of natural gas combusted, in MMscf, on a monthly basis. [401 KAR 52:030, Section 10]

b. The permittee shall monitor the 12-month rolling total VOC emissions monthly. [401 KAR 52:030, Section 10]

SECTION B - EMISSION POINTS, EMISSION UNITS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

5. Specific Recordkeeping Requirements:

a. The permittee shall maintain records of the amount of natural gas combusted, in MMscf, on a monthly basis. [401 KAR 52:030, Section 10]

b. The permittee shall keep records of the manufacturer's recommended procedures for startup and shutdown, any instance in which the recommended procedures were not followed, and any corrective action taken. [401 KAR 52:030, Section 10]

c. At the end of each month, the permittee shall calculate VOC emissions according to Section D, and every month, a new 12-month rolling total for VOC emissions shall be calculated and recorded. [401 KAR 52:030, Section 10]

6. Specific Reporting Requirements:

The permittee shall report the amount of natural gas combusted, in MMscf, and the source wide monthly and 12 month rolling total VOC emissions as part of the semiannual reporting as required in Section F (5) & (6).

SECTION C - INSIGNIFICANT ACTIVITIES

The following listed activities have been determined to be insignificant activities for this source pursuant to 401 KAR 52:030, Section 6. Although these activities are designated as insignificant the permittee must comply with the applicable regulation. Process and emission control equipment at each insignificant activity subject to an opacity standard shall be inspected monthly and a qualitative visible emissions evaluation made. Results of the inspection, evaluation, and any corrective action shall be recorded in a log.

	Description	Generally Applicable Regulation
1.	Baler	401 KAR 59:010
2.	Parts Washer (EU05)	401 KAR 63:020
3.	Doctor Blade Roller Cleaner (EU08)	401 KAR 63:020

SECTION D - SOURCE EMISSION LIMITATIONS AND TESTING REQUIREMENTS

1. As required by Section 1b of the *Cabinet Provisions and Procedures for Issuing Federally-Enforceable Permits for Non-Major Sources* incorporated by reference in 401 KAR 52:030, Section 26; compliance with annual emissions and processing limitations contained in this permit, shall be based on emissions and processing rates for any twelve (12) consecutive months.

2. VOC, Particulate Matter, and Opacity emissions, measured by applicable reference methods, or an equivalent or alternative method specified in 40 C.F.R. Chapter I, or by a test method specified in the state implementation plan shall not exceed the respective limitations specified herein.

3. Source-wide emissions of VOC shall not exceed 90 tons during any consecutive 12-month period. [To preclude 401 KAR 52:020]

   Compliance Demonstration Method:

   a. The following equation (or equivalent method) may be used to calculate VOC emissions from printing operations:

$$\text{Monthly VOC Emissions} = \sum_{i=1}^{n} M_i \rho_i (1 - C * D)$$

   Where;

   ρ = weight percent of VOC in each solvent containing material less water and/or exempt solvent used during the month, (lbs/lb).
   i = individual solvent containing material (i.e. inks, thinner, etc.)
   n = total number of solvent containing materials used
   M = pounds of solvent containing material “i “ used
   C = Capture efficiency, expressed as decimal
   D = Control (destruction) efficiency, expressed as decimal

   Source-wide VOC emissions = Σ [VOC emissions printing operations] + Σ [VOC emissions from natural gas combustion units] + Σ [VOC emissions from Insignificant Activities, if applicable]

   b. Compliance with annual limits is based on a rolling 12-month total. Emissions shall be calculated on a monthly basis and shall be added to previous eleven months emissions to get the total actual emissions for each consecutive 12-month period.

SECTION E - SOURCE CONTROL EQUIPMENT REQUIREMENTS

Pursuant to 401 KAR 50:055, Section 2(5), at all times, including periods of startup, shutdown and malfunction, owners and operators shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Division which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source.

SECTION F - MONITORING, RECORDKEEPING, AND REPORTING REQUIREMENTS

1. Pursuant to Section 1b-IV-1 of the *Cabinet Provisions and Procedures for Issuing Federally-Enforceable Permits for Non-Major Sources* incorporated by reference in 401 KAR 52:030 Section 26, when continuing compliance is demonstrated by periodic testing or instrumental monitoring, the permittee shall compile records of required monitoring information that include:
   a. Date, place (as defined in this permit), and time of sampling or measurements;
   b. Analyses performance dates;
   c. Company or entity that performed analyses;
   d. Analytical techniques or methods used;
   e. Analyses results; and
   f. Operating conditions during time of sampling or measurement.

2. Records of all required monitoring data and support information, including calibrations, maintenance records, and original strip chart recordings, and copies of all reports required by the Division for Air Quality, shall be retained by the permittee for a period of five (5) years and shall be made available for inspection upon request by any duly authorized representative of the Division for Air Quality [401 KAR 52:030, Section 3(1)(f)1a, and Section 1a-7 of the *Cabinet Provisions and Procedures for Issuing Federally-Enforceable Permits for Non-Major Sources* incorporated by reference in 401 KAR 52:030, Section 26].

3. In accordance with the requirements of 401 KAR 52:030, Section 3(1)f, the permittee shall allow authorized representatives of the Cabinet to perform the following during reasonable times:
   a. Enter upon the premises to inspect any facility, equipment (including air pollution control equipment), practice, or operation;
   b. To access and copy any records required by the permit;
   c. Sample or monitor, at reasonable times, substances or parameters to assure compliance with the permit or any applicable requirements.

   Reasonable times are defined as during all hours of operation, during normal office hours; or during an emergency.

4. No person shall obstruct, hamper, or interfere with any Cabinet employee or authorized representative while in the process of carrying out official duties. Refusal of entry or access may constitute grounds for permit revocation and assessment of civil penalties.

5. Summary reports of any monitoring required by this permit shall be submitted to the Regional Office listed on the front of this permit at least every six (6) months during the life of this permit, unless otherwise stated in this permit. For emission units that were still under construction or which had not commenced operation at the end of the 6-month period covered by the report and are subject to monitoring requirements in this permit, the report shall indicate that no monitoring was performed during the previous six months because the emission unit was not in operation [Sections 1b-V-1 of the *Cabinet Provisions and Procedures for Issuing Federally-Enforceable Permits for Non-Major Sources* incorporated by reference in 401 KAR 52:030, Section 26].

6. The semi-annual reports are due by January 30th and July 30th of each year. All reports shall be certified by a responsible official pursuant to 401 KAR 52:030, Section 22. If continuous

SECTION F - MONITORING, RECORDKEEPING, AND REPORTING REQUIREMENTS (CONTINUED)

emission and opacity monitors are required by regulation or this permit, data shall be reported in accordance with the requirements of 401 KAR 59:005, General Provisions, Section 3(3). All deviations from permit requirements shall be clearly identified in the reports.

7. In accordance with the provisions of 401 KAR 50:055, Section 1, the owner or operator shall notify the Regional Office listed on the front of this permit concerning startups, shutdowns, or malfunctions as follows:
   a. When emissions during any planned shutdowns and ensuing startups will exceed the standards, notification shall be made no later than three (3) days before the planned shutdown, or immediately following the decision to shut down, if the shutdown is due to events which could not have been foreseen three (3) days before the shutdown.
   b. When emissions due to malfunctions, unplanned shutdowns and ensuing startups are or may be in excess of the standards, notification shall be made as promptly as possible by telephone (or other electronic media) and shall be submitted in writing upon request.

8. The permittee shall promptly report deviations from permit requirements, including those attributable to upset conditions as defined in the permit, the probable cause of such deviations, and any corrective actions or preventive measures taken shall be submitted to the Regional Office listed on the front of this permit. Where the underlying applicable requirement contains a definition of prompt or otherwise specifies a time frame for reporting deviations, that definition or time frame shall govern. Where the underlying applicable requirement does not identify a specific time frame for reporting deviations, prompt reporting, as required by Sections 1b-V, 3 and 4 of the *Cabinet Provisions and Procedures for Issuing Federally-Enforceable Permits for Non-Major Sources* incorporated by reference in 401 KAR 52:030, Section 26 shall be defined as follows:
   a. For emissions of a hazardous air pollutant or a toxic air pollutant (as identified in an applicable regulation) that continue for more than an hour in excess of permit requirements, the report must be made within 24 hours of the occurrence.
   b. For emissions of any regulated air pollutant, excluding those listed in F.8.a., that continue for more than two hours in excess of permit requirements, the report must be made within 48 hours.
   c. All deviations from permit requirements, including those previously reported, shall be included in the semiannual report required by F.6.

9. Pursuant to 401 KAR 52:030, Section 21, the permittee shall annually certify compliance with the terms and conditions contained in this permit by completing and returning a Compliance Certification Form (DEP 7007CC) (or an alternative approved by the regional office) to the Regional Office listed on the front of this permit in accordance with the following requirements:
   a. Identification of each term or condition;
   b. Compliance status of each term or condition of the permit;
   c. Whether compliance was continuous or intermittent;
   d. The method used for determining the compliance status for the source, currently and over the reporting period.
   e. For an emissions unit that was still under construction or which has not commenced operation at the end of the 12-month period covered by the annual compliance certification, the permittee shall indicate that the unit is under construction and that compliance with any

SECTION F - MONITORING, RECORDKEEPING, AND REPORTING REQUIREMENTS (CONTINUED)

applicable requirements will be demonstrated within the timeframes specified in the permit.

f. The certification shall be submitted by January 30th of each year. Annual compliance certifications shall be sent to the Division for Air Quality, Bowling Green Regional Office, 2642 Russellville Road, Bowling Green, KY 42104.

10. In accordance with 401KAR 52:030, Section 3(1)(d), the permittee shall provide the Division with all information necessary to determine its subject emissions within 30 days of the date the Kentucky Emissions Inventory System (KYEIS) emissions survey is mailed to the permittee. If a KYEIS emissions survey is not mailed to the permittee, then the permittee shall comply with all other emissions reporting requirements in this permit.

11. The Cabinet may authorize the temporary use of an emission unit to replace a similar unit that is taken off-line for maintenance, if the following conditions are met:
    a. The owner or operator shall submit to the Cabinet, at least ten (10) days in advance of replacing a unit, the appropriate Forms DEP7007AI to DD that show:
        (1) The size and location of both the original and replacement units; and
        (2) Any resulting change in emissions;
    b. The potential to emit (PTE) of the replacement unit shall not exceed that of the original unit by more than twenty-five (25) percent of a major source threshold, and the emissions from the unit shall not cause the source to exceed the emissions allowable under the permit;
    c. The PTE of the replacement unit or the resulting PTE of the source shall not subject the source to a new applicable requirement;
    d. The replacement unit shall comply with all applicable requirements; and
    e. The source shall notify Regional office of all shutdowns and start-ups.
    f. Within six (6) months after installing the replacement unit, the owner or operator shall:
        (1) Re-install the original unit and remove or dismantle the replacement unit; or
        (2) Submit an application to permit the replacement unit as a permanent change.

SECTION G - GENERAL PROVISIONS

1. General Compliance Requirements

   a. The permittee shall comply with all conditions of this permit. A noncompliance shall be a violation of 401 KAR 52:030, Section 3(1)(b), and a violation of Federal Statute 42 USC 7401 through 7671q (the Clean Air Act). Noncompliance with this permit is grounds for enforcement action including but not limited to the termination, revocation and reissuance, revision, or denial of a permit [Section 1a-2 of the *Cabinet Provisions and Procedures for Issuing Federally-Enforceable Permits for Non-Major Sources* incorporated by reference in 401 KAR 52:030, Section 26].

   b. The filing of a request by the permittee for any permit revision, revocation, reissuance, or termination, or of a notification of a planned change or anticipated noncompliance, shall not stay any permit condition [Section 1a-5 of the *Cabinet Provisions and Procedures for Issuing Federally-Enforceable Permits for Non-Major Sources* incorporated by reference in 401 KAR 52:030, Section 26].

   c. This permit may be revised, revoked, reopened and reissued, or terminated for cause in accordance with 401 KAR 52:030, Section 18. The permit will be reopened for cause and revised accordingly under the following circumstances:
      (1) If additional applicable requirements become applicable to the source and the remaining permit term is three (3) years or longer. In this case, the reopening shall be completed no later than eighteen (18) months after promulgation of the applicable requirement. A reopening shall not be required if compliance with the applicable requirement is not required until after the date on which the permit is due to expire, unless this permit or any of its terms and conditions have been extended pursuant to 401 KAR 52:030, Section 12;
      (2) The Cabinet or the United States Environmental Protection Agency (U. S. EPA) determines that the permit must be revised or revoked to assure compliance with the applicable requirements;
      (3) The Cabinet or the U. S. EPA determines that the permit contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of the permit.

      Proceedings to reopen and reissue a permit shall follow the same procedures as apply to initial permit issuance and shall affect only those parts of the permit for which cause to reopen exists. Reopenings shall be made as expeditiously as practicable. Reopenings shall not be initiated before a notice of intent to reopen is provided to the source by the Division, at least thirty (30) days in advance of the date the permit is to be reopened, except that the Division may provide a shorter time period in the case of an emergency.

   d. The permittee shall furnish information upon request of the Cabinet to determine if cause exists for modifying, revoking and reissuing, or terminating the permit; or to determine compliance with the conditions of this permit [Sections 1a- 6 and 7 of the *Cabinet Provisions and Procedures for Issuing Federally-Enforceable Permits for Non-Major Sources* incorporated by reference in 401 KAR 52:030, Section 26].

   e. Emission units described in this permit shall demonstrate compliance with applicable requirements if requested by the Division [401 KAR 52:030, Section 3(1)(c)].

SECTION G - GENERAL PROVISIONS (CONTINUED)

f. The permittee, upon becoming aware that any relevant facts were omitted or incorrect information was submitted in the permit application, shall promptly submit such supplementary facts or corrected information to the permitting authority [401 KAR 52:030, Section 7(1)].

g. Any condition or portion of this permit which becomes suspended or is ruled invalid as a result of any legal or other action shall not invalidate any other portion or condition of this permit [Section 1a-11 of the *Cabinet Provisions and Procedures for Issuing Federally-Enforceable Permits for Non-Major Sources* incorporated by reference in 401 KAR 52:030, Section 26].

h. The permittee shall not use as a defense in an enforcement action the contention that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance [Section 1a-3 of the *Cabinet Provisions and Procedures for Issuing Federally-Enforceable Permits for Non-Major Sources* incorporated by reference in 401 KAR 52:030, Section 26].

i. All emission limitations and standards contained in this permit shall be enforceable as a practical matter. All emission limitations and standards contained in this permit are enforceable by the U.S. EPA and citizens except for those specifically identified in this permit as state-origin requirements. [Section 1a-12 of the Cabinet Provisions and Procedures for Issuing Federally-Enforceable Permits for Non-Major Sources incorporated by reference in 401 KAR 52:030, Section 26].

j. This permit shall be subject to suspension if the permittee fails to pay all emissions fees within 90 days after the date of notice as specified in 401 KAR 50:038, Section 3(6) [Section 1a-9 of the *Cabinet Provisions and Procedures for Issuing Federally-Enforceable Permits for Non-Major Sources* incorporated by reference in 401 KAR 52:030, Section 26].

k. Nothing in this permit shall alter or affect the liability of the permittee for any violation of applicable requirements prior to or at the time of permit issuance [401 KAR 52:030, Section 11(3)].

l. This permit does not convey property rights or exclusive privileges [Section 1a-8 of the *Cabinet Provisions and Procedures for Issuing Federally-Enforceable Permits for Non-Major Sources* incorporated by reference in 401 KAR 52:030, Section 26].

m. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits, licenses, or approvals required by the Cabinet or any other federal, state, or local agency.

n. Nothing in this permit shall alter or affect the authority of U.S. EPA to obtain information pursuant to Federal Statute 42 USC 7414, Inspections, monitoring, and entry.

o. Nothing in this permit shall alter or affect the authority of U.S. EPA to impose emergency orders pursuant to Federal Statute 42 USC 7603, Emergency orders.

SECTION G - GENERAL PROVISIONS (CONTINUED)

p. This permit consolidates the authority of any previously issued PSD, NSR, or Synthetic Minor source preconstruction permit terms and conditions for various emission units and incorporates all requirements of those existing permits into one single permit for this source.

q. Pursuant to 401 KAR 52:030, Section 11, a permit shield shall not protect the owner or operator from enforcement actions for violating an applicable requirement prior to or at the time of permit issuance. Compliance with the conditions of this permit shall be considered compliance with:
(1) Applicable requirements that are included and specifically identified in this permit; and
(2) Non-applicable requirements expressly identified in this permit.

2. Permit Expiration and Reapplication Requirements

a. This permit shall remain in effect for a fixed term of five (5) years following the original date of issue. Permit expiration shall terminate the source's right to operate unless a timely and complete renewal application has been submitted to the Division at least six (6) months prior to the expiration date of the permit. Upon a timely and complete submittal, the authorization to operate within the terms and conditions of this permit, including any permit shield, shall remain in effect beyond the expiration date, until the renewal permit is issued or denied by the Division [401 KAR 52:030, Section 12].

b. The authority to operate granted through this permit shall cease to apply if the source fails to submit additional information requested by the Division after the completeness determination has been made on any application, by whatever deadline the Division sets [401 KAR 52:030, Section 8(2)].

3. Permit Revisions

a. Minor permit revision procedures specified in 401 KAR 52:030, Section 14(3), may be used for permit revisions involving the use of economic incentive, marketable permit, emission trading, and other similar approaches, to the extent that these minor permit revision procedures are explicitly provided for in the State Implementation Plan (SIP) or in applicable requirements and meet the relevant requirements of 401 KAR 52:030, Section 14(2).

b. This permit is not transferable by the permittee. Future owners and operators shall obtain a new permit from the Division for Air Quality. The new permit may be processed as an administrative amendment if no other change in this permit is necessary, and provided that a written agreement containing a specific date for transfer of permit responsibility coverage and liability between the current and new permittee has been submitted to the permitting authority within ten (10) days following the transfer.

4. Construction, Start-Up, and Initial Compliance Demonstration Requirements

No construction authorized by this permit (F-24-041).

SECTION G - GENERAL PROVISIONS (CONTINUED)

5. Testing Requirements

   a. Pursuant to 401 KAR 50:045, Section 2, a source required to conduct a performance test shall submit a completed Compliance Test Protocol form, DEP form 6028, or a test protocol a source has developed for submission to other regulatory agencies, in a format approved by the cabinet, to the Division's Frankfort Central Office a minimum of sixty (60) days prior to the scheduled test date. Pursuant to 401 KAR 50:045, Section 7, the Division shall be notified of the actual test date at least Thirty (30) days prior to the test.

   b. Pursuant to 401 KAR 50:045, Section 5, in order to demonstrate that a source is capable of complying with a standard at all times, any required performance test shall be conducted under normal conditions that are representative of the source's operations and create the highest rate of emissions. If [When] the maximum production rate represents a source's highest emissions rate and a performance test is conducted at less than the maximum production rate, a source shall be limited to a production rate of no greater than 110 percent of the average production rate during the performance tests. If and when the facility is capable of operation at the rate specified in the application, the source may retest to demonstrate compliance at the new production rate. The Division for Air Quality may waive these requirements on a case-by-case basis if the source demonstrates to the Division's satisfaction that the source is in compliance with all applicable requirements.

   c. Results of performance test(s) required by the permit shall be submitted to the Division by the source or its representative within forty-five days or sooner if required by an applicable standard, after the completion of the fieldwork.

6. Acid Rain Program Requirements

   If an applicable requirement of Federal Statute 42 USC 7401 through 7671q (the Clean Air Act) is more stringent than an applicable requirement promulgated pursuant to Federal Statute 42 USC 7651 through 7651o (Title IV of the Act), both provisions shall apply, and both shall be state and federally enforceable.

7. Emergency Provisions

   a. Pursuant to 401 KAR 52:030, Section 23(1), an emergency shall constitute an affirmative defense to an action brought for noncompliance with the technology-based emission limitations if the permittee demonstrates through properly signed contemporaneous operating logs or other relevant evidence that:
      (1) An emergency occurred and the permittee can identify the cause of the emergency;
      (2) The permitted facility was at the time being properly operated;
      (3) During an emergency, the permittee took all reasonable steps to minimize levels of emissions that exceeded the emissions standards or other requirements in the permit; and,
      (4) The permittee notified the Division as promptly as possible and submitted written notice of the emergency to the Division within two (2) working days of the time when emission limitations were exceeded due to an emergency. The notice shall include a description of the emergency, steps taken to mitigate emissions, and the corrective actions taken.

SECTION G - GENERAL PROVISIONS (CONTINUED)

(5) Notification of the Division does not relieve the source of any other local, state or federal notification requirements.

b. Emergency conditions listed in General Provision G.7.a above are in addition to any emergency or upset provision(s) contained in an applicable requirement [401 KAR 52:030, Section 23(3)].

c. In an enforcement proceeding, the permittee seeking to establish the occurrence of an emergency shall have the burden of proof [401 KAR 52:030, Section 23(2)].

8. Ozone depleting substances

a. The permittee shall comply with the standards for recycling and emissions reduction pursuant to 40 CFR 82, Subpart F, except as provided for Motor Vehicle Air Conditioners (MVACs) in Subpart B:
(1) Persons opening appliances for maintenance, service, repair, or disposal shall comply with the required practices contained in 40 CFR 82.156.
(2) Equipment used during the maintenance, service, repair, or disposal of appliances shall comply with the standards for recycling and recovery equipment contained in 40 CFR 82.158.
(3) Persons performing maintenance, service, repair, or disposal of appliances shall be certified by an approved technician certification program pursuant to 40 CFR 82.161.
(4) Persons disposing of small appliances, MVACs, and MVAC-like appliances (as defined at 40 CFR 82.152) shall comply with the recordkeeping requirements pursuant to 40 CFR 82.166.
(5) Persons owning commercial or industrial process refrigeration equipment shall comply with the leak repair requirements pursuant to 40 CFR 82.156.
(6) Owners/operators of appliances normally containing 50 or more pounds of refrigerant shall keep records of refrigerant purchased and added to such appliances pursuant to 40 CFR 82.166.

b. If the permittee performs service on motor (fleet) vehicle air conditioners containing ozone-depleting substances, the source shall comply with all applicable requirements as specified in 40 CFR 82, Subpart B, *Servicing of Motor Vehicle Air Conditioners*.

9. Risk Management Provisions

a. The permittee shall comply with all applicable requirements of 401 KAR Chapter 68, Chemical Accident Prevention, which incorporates by reference 40 CFR Part 68, Risk Management Plan provisions. If required, the permittee shall comply with the Risk Management Program and submit a Risk Management Plan to U.S. EPA using the RMP* eSubmit software.

b. If requested, submit additional relevant information to the Division or the U.S. EPA.

SECTION H - ALTERNATE OPERATING SCENARIOS

None.

SECTION I - COMPLIANCE SCHEDULE

None.

Appendix T
VISCREEN Results

Visual Effects Screening Analysis for
Source: FWNA-Franklin, KY
Class I Area: Mammoth Caves National P

*** Level-1 Screening ***

Input Emissions for

Particulates	28.48	TON/YR
NOx (as NO2)	13.24	TON/YR
Primary NO2	0.00	TON/YR
Soot	0.00	TON/YR
Primary SO4	0.00	TON/YR

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	0.04 ppm
Background Visual Range:	180.00 km
Source-Observer Distance:	51.00 km
Min. Source-Class I Distance:	51.00 km
Max. Source-Class I Distance:	62.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

						Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume		Crit	Plume
SKY	10.	129.	62.0	40.	2.00	0.344		0.05	0.007
SKY	140.	129.	62.0	40.	2.00	0.074		0.05	-0.003
TERRAIN	10.	84.	51.0	84.	2.00	0.790		0.05	0.006
TERRAIN	140.	84.	51.0	84.	2.00	0.050		0.05	0.001

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE Exceeded

						Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume		Crit	Plume

SKY	10.	0.	1.0	169.	2.31	5.257*	0.05	0.082*
SKY	140.	0.	1.0	169.	2.00	1.056	0.05	-0.033
TERRAIN	10.	0.	1.0	169.	2.00	6.388*	0.05	0.063*
TERRAIN	140.	0.	1.0	169.	2.00	1.316	0.05	0.031

Appendix U
KDAQ Permit Application Forms

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601
(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information
___ Section AI.2: Applicant Information
___ Section AI.3: Owner Information
___ Section AI.4: Type of Application
___ Section AI.5: Other Required Information
___ Section AI.6: Signature Block
___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

___ Additional Documentation attached

Source Name: **Fritz Winter North America, LP**

KY EIS (AFS) #: **21- 213-00064**

Permit #: **V-16-022 R1**

Agency Interest (AI) ID: **129745**

Date: **7/1/2025**

Section AI.1: Source Information

Physical Location Address:	**Street:**	1 Fritz Winter Drive				
	City:	Franklin	**County:**	Simpson	**Zip Code:**	42134
Mailing Address:	**Street or P.O. Box:**	1 Fritz Winter Drive				
	City:	Franklin	**State:**	KY	**Zip Code:**	42134

Standard Coordinates for Source Physical Location

Longitude: 36.79749 (decimal degrees) **Latitude:** -86.554991 (decimal degrees)

Primary (NAICS) Category: Motor Vehicle Brake System Mfg. **Primary NAICS #:** 336340

#

Classification (SIC) Category: Motor Vehicle Parts and Accessories **Primary SIC #:** 3714

Briefly discuss the type of business conducted at this site: The casting and machining of iron parts for the automotive industry.

Description of Area Surrounding Source: ☐ Rural Area ☑ Industrial Park ☐ Residential Area ☐ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employees: 300

Approximate distance to nearest residence or commercial property: *0.4 miles*

Property Area:

Is this source portable? ☐ Yes ☑ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☑ Currently Hold	☐ Need	☐ N/A
RCRA:	☑ Currently Hold	☐ Need	☐ N/A
UST:	☐ Currently Hold	☐ Need	☑ N/A

Type of Regulated Waste Activity: ☐ Mixed Waste Generator ☑ Generator ☐ Recycler ☐ Other: _____ ☐ U.S. Importer of Hazardous Waste ☐ Transporter ☐ Treatment/Storage/Disposal Facility ☐ N/A

Section AI.2: Applicant Information

Applicant Name: Fritz Winter North America, LP

Title: (if individual)

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** KY **Zip Code:** 42134

Email: (if individual)

Phone: (270) 813-4000

Technical Contact

Name: Jordan Smith

Title: EHS Engineer

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** Kentucky **Zip Code:** 42134

Email: Jordan.Smith@fritzwinter.us

Phone: (270) 813-4000 ext. 172

Air Permit Contact for Source

Name: Curtis Mabry

Title: EHS Manager

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** Kentucky **Zip Code:** 42134

Email: curtis.mabry.fritzwinter.us

Phone: (270) 813-4000 ext. 142

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name:

Title:

Mailing Address: **Street or P.O. Box:**
City: **State:** **Zip Code:**

Email:

Phone:

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☑ Significant Revision	☐ Administrative Permit Amendment
☐ Renewal Permit	☐ Revised Registration	☐ Minor Revision	☐ Initial Source-wide OperatingPermit
☐ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☑ Revision	☐ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☑ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☑ Yes ☐ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☑ Particulate Matter	28.54	☑ Single HAP	9.9
☑ Volatile Organic Compounds (VOC)	223.47	☑ Combined HAPs	24.9
☑ Carbon Monoxide	333.80	☐ Air Toxics (40 CFR 68, Subpart F)	
☑ Nitrogen Oxides	39.9	☐ Carbon Dioxide	
☑ Sulfur Dioxide	39.9	☐ Greenhouse Gases (GHG)	
☑ Lead	0.59	☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* _____ **Proposed Operation Start-Up Date:** *(MM/YYYY)* _____

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)* Permit Issuance Date **Proposed Operation Start-Up Date:** *(MM/YYYY)* Permit Issuance Date

Applicant is seeking coverage under a permit shield. ☐ Yes ☑ No **Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.**

Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

☐ DEP7007A Indirect Heat Exchangers and Turbines	☑ DEP7007CC Compliance Certification
☑ DEP7007B Manufacturing or Processing Operations	☐ DEP7007DD Insignificant Activities
☐ DEP7007C Incinerators and Waste Burners	☑ DEP7007EE Internal Combustion Engines
☐ DEP7007F Episode Standby Plan	☐ DEP7007FF Secondary Aluminum Processing
☑ DEP7007J Volatile Liquid Storage	☑ DEP7007GG Control Equipment
☑ DEP7007K Surface Coating or Printing Operations	☐ DEP7007HH Haul Roads
☐ DEP7007L Mineral Processes	☐ Confidentiality Claim
☐ DEP7007M Metal Cleaning Degreasers	☐ Ownership Change Form
☑ DEP7007N Source Emissions Profile	☐ Secretary of State Certificate
☐ DEP7007P Perchloroethylene Dry Cleaning Systems	☑ Flowcharts or diagrams depicting process
☐ DEP7007R Emission Offset Credit	☐ Digital Line Graphs (DLG) files of buldings, roads, etc.
☐ DEP7007S Service Stations	☑ Site Map
☐ DEP7007T Metal Plating and Surface Treatment Operations	☐ Map or drawing depicting location of facility
☑ DEP7007V Applicable Requirements and Compliance Activities	☑ Safety Data Sheet (SDS)
☐ DEP7007Y Good Engineering Practice and Stack Height Determination	☐ Emergency Response Plan
☑ DEP7007AA Compliance Schedule for Non-complying Emission Units	☑ Other: ___ Calcs
☐ DEP7007BB Certified Progress Report	

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.

_____ **Authorized Signature**

8-22-2025 **Date**

Henning Knipper **Type or Printed Name of Signatory**

CEO **Title of Signatory**

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations
Form identifies revised technical and environmental contact.

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007B

Manufacturing or Processing Operations

___ Section B.1: Process Information
___ Section B.2: Materials and Fuel Information
___ Section B.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.
___ Attach a flow diagram
___ Attach SDS

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 11/30/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU01	Charge Handling	Delivery and storage of scrap steel, alloys and fluxes	EU01	Charge Handling	N/A	N/A	09/2016	Batch	N/A	N/A
EU05	Refractory Burner #1	Portable gas ladle drying unit	EU05	Refractory Burner #1	Gaylord	1.3MM-FDS-63	05/2017 (purchased)	Batch	Varies	Varies
EU06	Refractory Burner #2	Portable gas ladle drying unit	EU06	Refractory Burner #2	Gaylord	1.3MM-FDS-63	05/2017 (purchased)	Batch	Varies	Varies
EU07	Induction Furnace #1	Induction powered melt furnace	EU07	Induction Furnace #1	Junker	MFTGe Duomelt	03/2017	Batch	Varies	Varies
EU08	Induction Furnace #2	Induction powered melt furnace	EU08	Induction Furnace #2	Junker	MFTGe Duomelt	03/2017	Batch	Varies	Varies
EU09	Induction Furnace #3	Induction powered melt furnace	EU09	Induction Furnace #3	Junker	MFTGe Duomelt	07/2019	Batch	Varies	Varies
EU10	Induction Furnace #4	Induction powered melt furnace	EU10	Induction Furnace #4	Junker	MFTGe Duomelt	07/2019	Batch	Varies	Varies

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DEP7007B

Manufacturing or Processing Operations

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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21-213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 3/30/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU13	Hot Metal Transfer	Transfer of molten metal from furnaces to pouring furnaces	EU13	Hot Metal Transfer	N/A	Custom fabricated	03/2017	Continuous	N/A	N/A
EU15	Pouring Furnace #1	Receiving and holding of molten metal prior to pouring	EU15	Pouring Furnace #1	Junker	RGDGe	03/2017	--	--	--
EU17	Melt and Core/Mold Baghouse Waste Dust Silo	Receiving and storage of baghouse dust from Melt Shop and Core/Mold Baghouses	EU17	Melt and Core/Mold Baghouse Waste Dust Silo	Luhr	Custom Fabrication	09/2016	Batch	Varies	Varies
EU18	Refractory Curing Mobile Burner	Mobile natural gas burner for curing refractory	EU18	Refractory Curing Mobile Burner	N/K	N/K	5/1/2017 (Purchased)	Batch	Varies	Varies
EU19	Mold Silica Sand Silo	Exterior silo for for receiving and holding of molding silica sand	EU19	Mold Silica Sand Silo	Sand Mold Systems	Custom Fabrication	03/2017	Batch	Varies	Varies
EU20	Blend Silo	Exterior silo for blend of carbonaceous mold sand additives	EU20	Blend Silo	Sand Mold Systems	Custom Fabrication	03/2017	Batch	Varies	Varies

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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21-213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 3/30/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU21	Bentonite Silo	Exterior silo for storage of clays	EU21	Bentonite Silo	Sand Mold Systems	Custom Fabrication	03/2017	Batch	Varies	Varies
EU22	Mold Sand Handling and Preparation	Screens, mullers, bins, hopers, belts to reclaim and prepare mold sand	EU22	Mold Sand Handling and Preparation	Sand Mold Systems	Custom Fabrication	03/2017	Continuous	N/A	N/A

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KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 3/30/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU33	Mold Making #1	Production of molds using prepared sand and pattern	EU33	Mold Making #1	Heinrich Wagner Sinto	ZFS-SD	01/2017	Batch	Varies	Varies
EU35A	Core Silica Sand Silo A	Interior silo for the receipt and storage of core sand	EU35A	Core Silica Sand Silo A	Laempe	Custom Fabricated	02/2017	Batch	Varies	Varies
EU35B	Core Silica Sand Silo B	Interior silo for the receipt and storage of core sand	EU35B	Core Silica Sand Silo B	Laempe	Custom Fabricated	02/2017	Batch	Varies	Varies
EU36	Core Sand Handling and Preparation	Sand Classifier, sand bins, and sand hoppers to prepare core sand	EU36	Core Sand Handling and Preparation	Laempe	Custom Fabricated	02/2017	Continuous	N/A	N/A
EU39	PUCB Core Machine #1	Production of cores using prepared core sand, resin and catalyst	EU39	PUCB Core Machine #1	Leampe	LHL50	03/2017	Batch	Varies	Varies
EU40	PUCB Core Machine #2	Production of cores using prepared core sand, resin and catalyst	EU40	PUCB Core Machine #2	Leampe	LHL50	03/2019	Batch	Varies	Varies

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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 3/31/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU43	Core Wash Station #1	Washing of cores following core making	EU43	Core Wash Station #1	N/A	N/A	03/2017	Continuous	N/A	N/A
EU44	Core Dryer #1	Drying of cores following application of wash	EU44	Core Dryer #1	ELPO	Custom Fabrication	04/2017	Continuous	N/A	N/A
EU45	Core Dryer #2	Drying of cores following application of wash	EU45	Core Dryer #2	ELPO	Custom Fabrication	03/2019	Continuous	N/A	N/A
EU50	Pouring #1	Pouring of molten metal into sand molds	EU50	Pouring #1	Junker	RGDGe	03/2017	Continuous	N/A	N/A

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Date: 3/31/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU52	Mold Cooling	Cooling of casting within sand mold.	EU52	Mold Cooling	Heinrich Wagner Sinto	ZFS-SD	01/2017	Continuous	N/A	N/A
EU53	Shakeout Conveyor	Separation of solidified casting and sand mold/core	EU53	Shakeout Conveyor	General Kinematics	Custom Fabrication	01/2017	Continuous	N/A	N/A
EU57	Sand Plant Waste Sand Silo	Silo for Waste Sand	EU57	Sand Plant Waste Sand Silo	Vogel & Schemmann	CBC-9/30	03/2017	Batch	Varies	Varies
EU59	Casting Cooling	Vibratory Casting Cooling Conveyor	EU59	Casting Cooling	General Kinematics	Custom Fabrication	01/2017	Continuous	N/A	N/A
EU60	Sorting Conveyor	Finished Product /Casting Scrap separation	EU60	Sorting Conveyor	General Kinematics	Custom Fabrication	12/2016	Continuous	N/A	N/A

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Date: 3/31/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU61	Steel Shot Blasting #1	Finished Product Blast Cleaning	EU61	Steel Shot Blasting #1	Vogel & Schemmann	CBC-9/30	04/2017	Continuous	N/A	N/A
EU63	Fettling Baghouse Waste Dust Silo	Outside Fettling Baghouse Waste Dust Silo	EU63	Fettling Baghouse Waste Dust Silo	Luhr	Custom Fabrication	11/2016	Batch	Varies	Varies
EU64	Auto Grinding #1	Grinder for flash removal	EU64	Auto Grinding #1	Reichmann	S1C	02/2019	Continuous	N/A	N/A
EU65	Auto Grinding #2	Grinder for flash removal	EU65	Auto Grinding #2	--	--	--	--	--	--
EU66	Machining Lines (9)	Turn and balance to final product specifications	EU66	Machining Lines (9)	EMAG	VL8	04/2017	Continuous	N/A	N/A
EU67	Perforation Line #2	Turn, balance & drill to final product specifications	EU67	Perforation Line #2	EMAG	VL8	04/2017	Continuous	N/A	N/A
EU68	Paint Line #3	Post-induction coating machine	EU68	Paint Line #3	Sturm	ZS16	09/2018	Continuous	N/A	N/A
EU69	Paint Line #2	Post-induction coating machine	EU69	Paint Line #2	Sturm	ZS16	11/2017	Continuous	N/A	N/A

Division for Air Quality

300 Sower Boulevard
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DEP7007B

Manufacturing or Processing Operations

___ Section B.1: Process Information
___ Section B.2: Materials and Fuel Information
___ Section B.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.
___ Attach a flow diagram
___ Attach SDS

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 4/1/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU71	Paint Line #1	Pre-induction coating machine	EU71	Paint Line #1	Sturm	ZS16	03/2017	Continuous	N/A	N/A
EU72	Emergency Generator #1	Generators for Emergency Power (750 KW - 1050 HP)	EU72	Emergency Generator #1	Caterpillar	C27	09/2016	--	--	--
EU73	Emergency Generator #2	Generators for Emergency Power (750 KW - 1050 HP)	EU73	Emergency Generator #2	Caterpillar	C27	09/2016	--	--	--
EU74	Emergency Generator #3	Generators for Emergency Power (40KW - 57 HP)	EU74	Emergency Generator #3	Caterpillar	D40-LC2	09/2016	--	--	--
EU75	Diesel Storage Tank	2,000 gal diesel storage tank	EU75	Diesel Storage Tank	N/A	N/A	07/2019	--	--	--
EU76	Paved Roads	Paved Roadways and Parking Areas	EU76	Paved Roads	N/A	N/A	09/2016	--	--	--
EU77	Snag Grinder #1	Grinder for flash removal	EU77	Snag Grinder #1	N/K	N/K	04/2017	Continuous	N/A	N/A
EU78	Snag Grinder #2	Grinder for flash removal	EU78	Snag Grinder #2	N/K	N/K	04/2017	Continuous	N/A	N/A
EU79	Core Wash Station #2	Washing of cores following core making	EU79	Core Wash Station #2	N/A	N/A	03/2019	Continuous	N/A	N/A

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DEP7007B

Manufacturing or Processing Operations

___ Section B.1: Process Information
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Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.
___ Attach a flow diagram
___ Attach SDS

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 4/1/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU82	Rust Preventative Application	Application of rust prohibitor to finished castings	EU82	Rust Preventative Application	N/A	NA	03/2017	Continuous	N/A	N/A
EU83	Rotary Sprue Cleaner and Conveyors	Cleaning of sprue and return of metallics and sand for separation.	EU83	Rotary Sprue Cleaner and Conveyors	N/A	N/A	06/2022	Continuous	N/A	N/A
EU84	Perforation Line #1	Turn, balance & drill to final product specifications	EU84	Perforation Line #1	EMAG	VL8	06/2022	Continuous	N/A	N/A

Section B.2: Materials and Fuel Information

Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU01	Charge Handling	Scrap Steel, Alloys, Fluxes	15	tons/hr	15 tons/hr	Steel Scrap	15	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU05	Refractory Burner #1	Natural Gas	--	--	--	NA	--	--	Natural Gas	8.5	MMbtu/ Hr	73	MMscf/ Yr	0%	0%
EU06	Refractory Burner #2	Natural Gas	--	--	--	NA	--	--	Natural Gas	8.5	MMbtu/ Hr	73	MMscf/ Yr	0	0
EU07	Induction Furnace #1	Scrap Steel, Alloys, Fluxes	10	tons/hr	10 tons/hr	Molten Grey Iron	10	tons/hr	Electric Induction	N/A	--	N/A	--	0	0
EU08	Induction Furnace #2	Scrap Steel, Alloys, Fluxes	10	tons/hr	10 tons/hr	Molten Grey Iron	10	tons/hr	Electric Induction	N/A	--	N/A	--	0%	0%
EU09	Induction Furnace #3	Scrap Steel, Alloys, Fluxes	10	tons/hr	10 tons/hr	Molten Grey Iron	10	tons/hr	Electric Induction	N/A	--	N/A	--	0%	0%
EU10	Induction Furnace #4	Scrap Steel, Alloys, Fluxes	10	tons/hr	10 tons/hr	Molten Grey Iron	10	tons/hr	Electric Induction	N/A	--	N/A	--	0%	0%
EU13	Hot Metal Transfer	Molten Grey Iron	25.3	tons/hr	25.3 tons/hr	Molten Grey Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU15	Pouring Furnace #1	Molten Grey Iron	25.3	tons/hr	25.3 tons/hr	Molten Grey Iron	25.3	tons/hr	Electric Induction	2.91	MMbtu/ Hr	24.99	MMscf/ Yr	0%	0%
EU17	Melt and Core/Mold Baghouse Waste Dust Silo	Molten Grey Iron	25.3	tons/hr	25.3 tons/hr	Molten Grey Iron	25.3	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

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Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input		Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output		Fuel Type	Maximum Hourly Fuel Usage Rate		Maximum Yearly Fuel Usage Rate		Sulfur Content (%)	Ash Content (%)
				(Specify Units/hr)				(Specify Units/hr)			(Specify Units)		(Specify Units)		
EU18	Refractory Curing Mobile Burner	NA	--	--	--	NA	--	--	Natural Gas	2	MMbtu/ Hr	17.18	MMscf/ Yr	0%	0%
EU19	Mold Silica Sand Silo	Sand	25	tons/hr	25 tons/hr	Sand	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU20	Blend Silo	Blend	25	tons/hr	25 tons/hr	Blend	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU21	Bentonite Silo	Bentonite	25	tons/hr	25 tons/hr	Bentonite	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU22	Mold Sand Handling and Preparation	Sand, clay, preblend and water	197	tons/hr	197 tons/hr	Sand	197	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU33	Mold Making #1	Prepared Mold Sand	99	tons/hr	99 tons/hr	Green Sand	99	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU34	Mold Making #2	Prepared Mold Sand	99	tons/hr	99 tons/hr	Green Sand	99	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU35A	Core Silica Sand Silo A	Core Sand	25	tons/hr	25 tons/hr	Core Sand	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU35B	Core Silica Sand Silo B	Core Sand	25	tons/hr	25 tons/hr	Core Sand	25	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU36	Core Sand Handling and Preparation	Core Sand	3.7	tons/hr	3.7 tons/hr	Core Sand	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU39	Core Machine #1	Core Sand Resin Catalyst Release Agent	3.7 92.5 9.25 4.2	tons/hr lbs/hr lbs/hr lbs/hr	3.7	Uncoated Cores	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU40	Core Machine #2	Core Sand Resin Catalyst Release Agent	3.7 92.5 9.25 4.2	tons/hr lbs/hr lbs/hr lbs/hr	3.7	Uncoated Cores	3.7	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU43	Core Wash Station #1	Uncoated Cores Wash	0.93 676	tons/hr lbs/hr	0.93 tons/hr	Uncoated Cores	0.93	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU44	Core Dryer #1	Coated Cores	0.93	tons/hr	0.93 tons/hr	Dry Coated Cores	0.93	tons/hr	Natural Gas	4.0	MMbtu/ Hr	34.35	MMscf/yr	0%	0%
EU45	Core Dryer #2	Coated Cores	0.93	tons/hr	0.93 tons/hr	Dry Coated Cores	0.93	tons/hr	Natural Gas	4.0	MMbtu/ Hr	34.35	MMscf/yr	0%	0%
EU50	Pouring #1	Molds Cores	99.15 1.8	tons/hr tons/hr	100.9 tons/hr	Mold Assembles	100.9 tons/hr	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU52	Mold Cooling	Assembled Molds Gray Iron	99 15	tons/hr tons/hr	114 tons/hr	Poured mold	114	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU53	Shakeout Conveyor	Poured Mold	114	tons/hr	114 tons/hr	Poured mold	114	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU57	Sand Plant Waste Sand Silo	Recycled Sand	202	tons/hr	202 tons/hr	Recycled Sand	202	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU59	Casting Cooling	Gray Iron	15	tons/hr	15 tons/hr	Gray Iron	15	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU60	Sorting Conveyor	Rough Casting	15	tons/hr	15 tons/hr	Rough Casting	15	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

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Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU61	Steel Shot Blasting #1	Rough Casting	15	tons/hr	15 tons/hr	Cleaned Casting	15	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU63	Fettling Baghouse Waste Dust Silo	Gray Iron	15	tons/hr	15 tons/hr	Gray Iron	15	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU64	Auto Grinding #1	Cleaned Casting	15	tons/hr	15 tons/hr	Ground Cleaned Casting	15	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU65	Auto Grinding #2	Cleaned Casting	15	tons/hr	15 tons/hr	Ground Cleaned Casting	15	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU66	Machining Lines (9)	Gray Iron	15	tons/hr	15 tons/hr	Ground Cleaned Casting	15	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU67	Perforation Line #2	Gray Iron	15	tons/hr	15 tons/hr	Ground Cleaned Casting	15	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU68	Paint Line #3	Machined Castings Post-Induction Coating Post-Induction Thinner	- 5.75 1.47	- lb/hr lb/hr	N/K	Coated Finished Casting	N/K	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU69	Paint Line #2	Machined Castings Post-Induction Coating Post-Induction Thinner	- 5.75 1.47	- lb/hr lb/hr	N/K	Coated Finished Casting	N/K	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU71	Paint Line #1	Machined Castings Pre-Induction Coating	-- 3.54	-- lb/hr	N/K	Coated Finished Casting	N/K	tons/hr	N/A	N/A	--	NA	--	0%	0%
EU72	Emergency Generator #1	--	--	--	N/A	--	--	--	Diesel	N/K	Gallons	N/K	Gallons	0%	0%
EU73	Emergency Generator #2	--	--	--	N/A	--	--	--	Diesel	N/K	Gallons	N/K	Gallons	0%	0%
EU74	Emergency Generator #3	--	--	--	N/A	--	--	--	Diesel	N/K	Gallons	N/K	Gallons	0%	0%
EU75	Diesel Storage Tank	Gasoline	NK	gal/hr	N/A	--	--	Gallons	N/A	N/A	--	N/A	--	0%	0%
EU76	Paved Roads	Diesel	NK	gal/hr	N/A	--	--	Diesel	N/A	N/A	--	N/A	--	0%	0%
EU77	Snag Grinder #1	Cleaned Casting	NK	tons/hr	N/K	Ground Cleaned Casting	N/K	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU78	Snag Grinder #2	Cleaned Casting	NK	tons/hr	N/K	Ground Cleaned Casting	N/K	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU79	Core Wash Station #2	Uncoated Cores Wash	0.93 676	tons/hr lbs/hr	0.93 tons/hr	Uncoated Cores	0.93	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU82	Rust Preventative Application	Finished Product Rust Preventative	15 20	tons/hr lbs/hr	15 tons/hr	Finished Product	15	tons/hr	N/A	N/A	--	N/A	--	0%	0%
EU83	Rotary Sprue Cleaner and Conveyors	Sprue Sand Metallics	6.6 10 NK	tons tons tons	16.6	Clean Sprue Sand Metallics	6.6 10 NK	tons tons tons	None	N/A	N/A	N/A	N/A	N/A	N/A
EU84	Perforation Line #1	Gray Iron	15	tons/hr	15 tons/hr	Ground Cleaned Casting	15	tons/hr	N/A	N/A	--	N/A	--	0%	0%

Section B.3: Notes, Comments, and Explanations
The following Emission Units have yet to be installed: EU03, EU04, EU11, EU12, EU15, EU34, EU41, EU42, EU46, EU47, EU49, EU51, EU58, EU62, EU65 (on order/not installed), EU70, EU75
EU77 : Change Paved Roadways from EU76 to EU77 as EU76 is already identified as the ID for the diesel storage tank.
Change maximum annual metal throughput rate to 80,000 tpy, rolling 12-month summation
Change maximum hourly capacity to from 25.3 tph metal to 15.0 tph
EU19-EU21, EU35A-EU35B: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU22-EU34,EU48,EU49: Combine into a single emission unit described as "Moldmaking and Sand Handling"
EU17: Change description from "Melt Shop Baghouse Waste Dust Silo" to "Melt and Core/Mold Baghouse Waste Dust Silo"

EU68, EU69 and EU71: Change emission unit name to Paint Line #3, Paint Line #2 and Paint Line #1, respectively
EU77-EU79, EU82-EU84: Added emission units

DEP7007K

Surface Coating or Printing Operations

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

__ Section K.1: Process Information

__ Section K.2: Coating Operations

__ Section K.3: Other Operations

__ Section K.4: Coatings/Printing Materials as Applied

__ Section K.5: HAP-containing Coatings/Printing Materials

__ Section K.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

___ Attach SDS or Technical Sheets for all Coating/Printing Materials

___ Attach a flow diagram

Source Name: **Fritz Winter North America, LP**

KY EIS (AFS) #: **21- 213-00064**

Permit #: **V-16-022 R1**

Agency Interest (AI) ID: **129745**

Date: **11/30/2021**

Section K.1: Process Information

Emission Unit #: EU68

Emission Unit Name: Paint Liine #3

Coating/Printing Line Name: Paint Line #3

Proposed/Actual Date of Construction: *(MM/YYYY)* Sep-18

List Applicable Regulations: See Air Permit V-16-022 R1

Describe Overall Process: See Air Permit V-16-022 R1

Describe Coatings/Printing Materials: See Air Permit V-16-022 R1

Identify the Material that is Coated/Printed: ☑ Metal ☐ Vinyl ☐ Plastics ☐ Wood ☐ Foil ☐ Paper ☐ Other Substrate

Provide detailed description of material coated/printed: See Air Permit V-16-022 R1

Provide approximate dimensions and range of sizes of parts being coated or printed:

Identify the Type of Operation: ☑ Continuous ☐ Batch ☐ Other:

Describe Surface Preparation/Pretreatment Steps: None

For Coating Operations: ☑ Spray ☐ Flow ☐ Dip tank ☐ Electrodeposition ☐ Brush ☐ Powder ☐ Roller Coat ☐ Other:

For Printing Operations: *(Select all that apply)* ☐ Web ☐ Rotogravure ☐ Heatset ☐ Lithographic ☐ Other: ☐ Sheetfed ☐ Letterpress ☐ Non-heatset ☐ Flexographic

Describe Final Product: Cast Iron Part

Check the category that most closely describes this unit:

☐ Large Appliance Coating ☐ Auto or Light-Duty Truck Coating ☐ Metal Furniture Coating ☐ Metal Coil Coating

☐ Beverage Can Coating ☑ Miscellaneious Metal Parts Coating ☐ Magnet Wire Insulation Coating ☐ Flat Wood Panel Coating

☐ Fabric, Vinyl, or Paper Coating ☐ Boat Manufacturing/ Ship Repair ☐ Pressure Sensitive Tape and Label Coating ☐ Magnet Tape Coating

☐ Publication Rotogravure Printing ☐ Coating of Plastic Parts for Business Machines ☐ Flexible Vinyl and Urethane Coating and Printing

☐ Graphic Arts using Rotogravure and Flexographic Printing ☐ Other: _____

Section K.2: Coating Operations

K.2A: For Spray Coating

Gun/Booth ID	Describe Function	Type	Mode	Maximum Design Application Rate (gal/hr or lb/hr)		Describe how maximum rate was determined
Paint Line #3		☐ Conventional Air Gun ☑ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☑ Automatic	9.0 1.0	lb/hr lb/hr	☐ Testing ☐ Equipment Specification Sheet ☑ Estimation
		☐ Conventional Air Gun ☐ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☐ Automatic			☐ Testing ☐ Equipment Specification Sheet ☐ Estimation
		☐ Conventional Air Gun ☐ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☐ Automatic			☐ Testing ☐ Equipment Specification Sheet ☐ Estimation

If spray guns are used simultaneously, describe:

K.2B: For Brush Coating

Describe Function:

Maximum Coating Application Rate: *(gal/hr)*

K.2C: For Roller Coating

Roller Coat ID	Describe Function	Maximum Coating Application Rate (gal/hr)	Describe how maximum rate was determined
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

K.2D: For Powder Coating

Powder Coat ID	Describe Function	Maximum Coating Application Rate (gal/hr or lb/hr)		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

If powder coating material is recycled, describe:

K.2E: For Flow Coating

Flow Coat ID	Describe Function	Maximum Coating Application Rate (gal/hr or lb/hr)		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

K.2F: For Dip Tank/Electrodeposition Coating

Tank ID	Describe Function	Maximum Make-up Rate (gal/hr or lb/hr)		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

Section K.3: Other Operations

K.3A: For Finishing

Describe Finishing Processes: *Complete Form DEP7007B as applicable*	None

K.3B: For Curing/Drying

Describe Curing/Drying Processes:	**Description**	**Rated Capacity** *(MMBtu/hr)*	**Fuel**	**Control Device/Stack ID**

K.3C: For Purge

Type: _____

Daily Usage: _____ gal/day

K.3D: For Clean-up

Type: ☐ Manual ☐ Automatic

Daily Usage: _____ hrs/day

Operating Hours: _____

K.3E: For Other Equipment

Describe Processes:	

Section K.4: Coatings/Printing Materials As Applied

Include SDS or Technical Sheets for all coating/printing materials used.

Trade Name of Material	Description *(Identify as coating, ink, fountain solution, blanket wash, cleaning solvent, thinning solvent, auto wash, manual wash, etc.)*	Emission Unit/Coating ID where material is used	SCC Code	SCC Code Units	Density *(lb/gal)*	Solid Content *(lb/gal)*	VOC Content *(lb/gal)*	Emission Factor for PM* *(lb/SCC)*	Transfer Efficiency *(%)*	Emission Factor for VOC *(lb/SCC)*	Capture Efficiency *(%)*	Control Device/ Stack ID
Worwag Coating Primer	Primer	EU68	-	-	25.75	22.4	3.42	-	70	-	100	CU14/ST15A
Warwag Coating Reducer	Thinner	EU68	-	-	7.26	0	7.26	-	N/A	-	100	CU14/ST15A

**Emission factor for particulate matter (PM) should not include transfer efficiency.*

Section K.5: Hazardous Air Pollutant-containing Coatings/Printing Materials

List each individual hazardous air pollutant (HAP) contained in each material.

Trade Name of Material	HAP Name	HAP CAS #	Identify Solid (*S*) or Volatile (*V*)	HAP % by weight	HAP Emission Factor *(lb/SCC)*	Control Device/ Stack ID
Worwag Coating Primer	Benzene	71-43-2	V	0.01%	-	CU14/ST15A
Worwag Coating Primer	Cumene	98-82-8	V	0.06%	-	CU14/ST15A
Worwag Coating Primer	Ethyl Benzene	100-41-4	V	0.95%	-	CU14/ST15A
Worwag Coating Primer	Toluene	108-88-3	V	0.02%	-	CU14/ST15A
Worwag Coating Primer	Xylene	1330-20-7	V	3.89%	-	CU14/ST15A
Warwag Coating Reducer	Cumene	98-82-8	V	0.54%	-	CU14/ST15A
Warwag Coating Reducer	Ethyl Benzene	100-41-4	V	3.30%	-	CU14/ST15A
Warwag Coating Reducer	Xylene	1330-20-7	V	6.19%	-	CU14/ST15A

Section K.6: Notes, Comments, and Explanations

DEP7007K

Surface Coating or Printing Operations

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

__ Section K.1: Process Information

__ Section K.2: Coating Operations

__ Section K.3: Other Operations

__ Section K.4: Coatings/Printing Materials as Applied

__ Section K.5: HAP-containing Coatings/Printing Materials

__ Section K.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

___ Attach SDS or Technical Sheets for all Coating/Printing Materials

___ Attach a flow diagram

Source Name: **Fritz Winter North America, LP**

KY EIS (AFS) #: **21- 213-00064**

Permit #: **V-16-022 R1**

Agency Interest (AI) ID: **129745**

Date: **11/30/2021**

Section K.1: Process Information

Emission Unit #: EU69

Emission Unit Name: Paint Liine #2

Coating/Printing Line Name: Paint Line #2

Proposed/Actual Date of Construction: *(MM/YYYY)* Nov-17

List Applicable Regulations: See Air Permit V-16-022 R1

Describe Overall Process: See Air Permit V-16-022 R1

Describe Coatings/Printing Materials: See Air Permit V-16-022 R1

Identify the Material that is Coated/Printed: ☑ Metal ☐ Vinyl ☐ Plastics ☐ Wood ☐ Foil ☐ Paper ☐ Other Substrate

Provide detailed description of material coated/printed: See Air Permit V-16-022 R1

Provide approximate dimensions and range of sizes of parts being coated or printed:

Identify the Type of Operation: ☑ Continuous ☐ Batch ☐ Other:

Describe Surface Preparation/Pretreatment Steps: None

For Coating Operations: ☑ Spray ☐ Flow ☐ Dip tank ☐ Electrodeposition ☐ Brush ☐ Powder ☐ Roller Coat ☐ Other:

For Printing Operations: *(Select all that apply)* ☐ Web ☐ Rotogravure ☐ Heatset ☐ Lithographic ☐ Other: ☐ Sheetfed ☐ Letterpress ☐ Non-heatset ☐ Flexographic

Describe Final Product: Cast Iron Part

Check the category that most closely describes this unit:

☐ Large Appliance Coating	☐ Auto or Light-Duty Truck Coating	☐ Metal Furniture Coating	☐ Metal Coil Coating
☐ Beverage Can Coating	☑ Miscellaneious Metal Parts Coating	☐ Magnet Wire Insulation Coating	☐ Flat Wood Panel Coating
☐ Fabric, Vinyl, or Paper Coating	☐ Boat Manufacturing/ Ship Repair	☐ Pressure Sensitive Tape and Label Coating	☐ Magnet Tape Coating
☐ Publication Rotogravure Printing	☐ Coating of Plastic Parts for Business Machines	☐ Flexible Vinyl and Urethane Coating and Printing	
☐ Graphic Arts using Rotogravure and Flexographic Printing			☐ Other:

Section K.2: Coating Operations

K.2A: For Spray Coating

Gun/Booth ID	Describe Function	Type	Mode	Maximum Design Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
Paint Line #2		☐ Conventional Air Gun ☑ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☑ Automatic	9.0 1.0	lb/hr lb/hr	☐ Testing ☐ Equipment Specification Sheet ☑ Estimation
		☐ Conventional Air Gun ☐ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☐ Automatic			☐ Testing ☐ Equipment Specification Sheet ☐ Estimation
		☐ Conventional Air Gun ☐ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☐ Automatic			☐ Testing ☐ Equipment Specification Sheet ☐ Estimation

If spray guns are used simultaneously, describe:

K.2B: For Brush Coating

Describe Function:

Maximum Coating Application Rate: *(gal/hr)*

K.2C: For Roller Coating

Roller Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr)*	Describe how maximum rate was determined
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

K.2D: For Powder Coating

Powder Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

If powder coating material is recycled, describe:	

K.2E: For Flow Coating

Flow Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

K.2F: For Dip Tank/Electrodeposition Coating

Tank ID	Describe Function	Maximum Make-up Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

Section K.3: Other Operations

K.3A: For Finishing

Describe Finishing Processes: *Complete Form DEP7007B as applicable*	None

K.3B: For Curing/Drying

Describe Curing/Drying Processes:	**Description**	**Rated Capacity** *(MMBtu/hr)*	**Fuel**	**Control Device/Stack ID**

K.3C: For Purge

Type: _____

Daily Usage: _____ gal/day

K.3D: For Clean-up

Type: ☐ Manual ☐ Automatic

Daily Usage: _____ hrs/day

Operating Hours: _____

K.3E: For Other Equipment

Describe Processes:	

Section K.4: Coatings/Printing Materials As Applied

Include SDS or Technical Sheets for all coating/printing materials used.

Trade Name of Material	Description *(Identify as coating, ink, fountain solution, blanket wash, cleaning solvent, thinning solvent, auto wash, manual wash, etc.)*	Emission Unit/Coating ID where material is used	SCC Code	SCC Code Units	Density *(lb/gal)*	Solid Content *(lb/gal)*	VOC Content *(lb/gal)*	Emission Factor for PM* *(lb/SCC)*	Transfer Efficiency *(%)*	Emission Factor for VOC *(lb/SCC)*	Capture Efficiency *(%)*	Control Device/ Stack ID
Worwag Coating Primer	Primer	EU68	-	-	25.75	22.4	3.42	-	70	-	100	CU15/ST15B
Warwag Coating Reducer	Thinner	EU68	-	-	7.26	0	7.26	-	N/A	-	100	CU15/ST15B

**Emission factor for particulate matter (PM) should not include transfer efficiency.*

Section K.5: Hazardous Air Pollutant-containing Coatings/Printing Materials

List each individual hazardous air pollutant (HAP) contained in each material.

Trade Name of Material	HAP Name	HAP CAS #	Identify Solid (*S*) or Volatile (*V*)	HAP % by weight	HAP Emission Factor *(lb/SCC)*	Control Device/ Stack ID
Worwag Coating Primer	Benzene	71-43-2	V	0.01%	-	CU15/ST15B
Worwag Coating Primer	Cumene	98-82-8	V	0.06%	-	CU15/ST15B
Worwag Coating Primer	Ethyl Benzene	100-41-4	V	0.95%	-	CU15/ST15B
Worwag Coating Primer	Toluene	108-88-3	V	0.02%	-	CU15/ST15B
Worwag Coating Primer	Xylene	1330-20-7	V	3.89%	-	CU15/ST15B
Warwag Coating Reducer	Cumene	98-82-8	V	0.54%	-	CU15/ST15B
Warwag Coating Reducer	Ethyl Benzene	100-41-4	V	3.30%	-	CU15/ST15B
Warwag Coating Reducer	Xylene	1330-20-7	V	6.19%	-	CU15/ST15B

Section K.6: Notes, Comments, and Explanations

DEP7007K

Surface Coating or Printing Operations

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

__ Section K.1: Process Information

__ Section K.2: Coating Operations

__ Section K.3: Other Operations

__ Section K.4: Coatings/Printing Materials as Applied

__ Section K.5: HAP-containing Coatings/Printing Materials

__ Section K.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

___ Attach SDS or Technical Sheets for all Coating/Printing Materials

___ Attach a flow diagram

Source Name: **Fritz Winter North America, LP**

KY EIS (AFS) #: **21- 213-00064**

Permit #: **V-16-022 R1**

Agency Interest (AI) ID: **129745**

Date: **11/30/2021**

Section K.1: Process Information

Emission Unit #: EU71

Emission Unit Name: Paint Liine #1

Coating/Printing Line Name: Paint Line #1

Proposed/Actual Date of Construction: *(MM/YYYY)* Mar-17

List Applicable Regulations: See Air Permit V-16-022 R1

Describe Overall Process: See Air Permit V-16-022 R1

Describe Coatings/Printing Materials: See Air Permit V-16-022 R1

Identify the Material that is Coated/Printed: ☑ Metal ☐ Vinyl ☐ Plastics ☐ Wood ☐ Foil ☐ Paper ☐ Other Substrate

Provide detailed description of material coated/printed: See Air Permit V-16-022 R1

Provide approximate dimensions and range of sizes of parts being coated or printed:

Identify the Type of Operation: ☑ Continuous ☐ Batch ☐ Other:

Describe Surface Preparation/Pretreatment Steps: None

For Coating Operations: ☑ Spray ☐ Flow ☐ Dip tank ☐ Electrodeposition ☐ Brush ☐ Powder ☐ Roller Coat ☐ Other:

For Printing Operations: *(Select all that apply)* ☐ Web ☐ Rotogravure ☐ Heatset ☐ Lithographic ☐ Other: ☐ Sheetfed ☐ Letterpress ☐ Non-heatset ☐ Flexographic

Describe Final Product: Cast Iron Part

Check the category that most closely describes this unit:

☐ Large Appliance Coating ☐ Auto or Light-Duty Truck Coating ☐ Metal Furniture Coating ☐ Metal Coil Coating

☐ Beverage Can Coating ☑ Miscellaneious Metal Parts Coating ☐ Magnet Wire Insulation Coating ☐ Flat Wood Panel Coating

☐ Fabric, Vinyl, or Paper Coating ☐ Boat Manufacturing/ Ship Repair ☐ Pressure Sensitive Tape and Label Coating ☐ Magnet Tape Coating

☐ Publication Rotogravure Printing ☐ Coating of Plastic Parts for Business Machines ☐ Flexible Vinyl and Urethane Coating and Printing

☐ Graphic Arts using Rotogravure and Flexographic Printing ☐ Other: _____

Section K.2: Coating Operations

K.2A: For Spray Coating

Gun/Booth ID	Describe Function	Type	Mode	Maximum Design Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
Paint Line #3		☐ Conventional Air Gun ☑ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☑ Automatic	5.5	lb/hr	☐ Testing ☐ Equipment Specification Sheet ☑ Estimation
		☐ Conventional Air Gun ☐ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☐ Automatic			☐ Testing ☐ Equipment Specification Sheet ☐ Estimation
		☐ Conventional Air Gun ☐ Airless ☐ HVLP ☐ Electrostatic ☐ LVLP ☐ Aerosol Spray Can ☐ Other	☐ Manual ☐ Automatic			☐ Testing ☐ Equipment Specification Sheet ☐ Estimation

If spray guns are used simultaneously, describe:

K.2B: For Brush Coating

Describe Function:

Maximum Coating Application Rate: *(gal/hr)*

K.2C: For Roller Coating

Roller Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr)*	Describe how maximum rate was determined
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
			☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

K.2D: For Powder Coating

Powder Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

If powder coating material is recycled, describe:	

K.2E: For Flow Coating

Flow Coat ID	Describe Function	Maximum Coating Application Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

K.2F: For Dip Tank/Electrodeposition Coating

Tank ID	Describe Function	Maximum Make-up Rate *(gal/hr or lb/hr)*		Describe how maximum rate was determined
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet
				☐ Testing ☐ Estimation ☐ Equipment Specification Sheet

Section K.3: Other Operations

K.3A: For Finishing

Describe Finishing Processes: *Complete Form DEP7007B as applicable*	None

K.3B: For Curing/Drying

Describe Curing/Drying Processes:	Description	Rated Capacity *(MMBtu/hr)*	Fuel	Control Device/Stack ID

K.3C: For Purge

Type: _____

Daily Usage: _____ gal/day

K.3D: For Clean-up

Type: ☐ Manual ☐ Automatic

Daily Usage: _____ hrs/day

Operating Hours: _____

K.3E: For Other Equipment

Describe Processes:	

Section K.4: Coatings/Printing Materials As Applied

Include SDS or Technical Sheets for all coating/printing materials used.

Trade Name of Material	Description *(Identify as coating, ink, fountain solution, blanket wash, cleaning solvent, thinning solvent, auto wash, manual wash, etc.)*	Emission Unit/Coating ID where material is used	SCC Code	SCC Code Units	Density *(lb/gal)*	Solid Content *(lb/gal)*	VOC Content *(lb/gal)*	Emission Factor for PM* *(lb/SCC)*	Transfer Efficiency *(%)*	Emission Factor for VOC *(lb/SCC)*	Capture Efficiency *(%)*	Control Device/ Stack ID
Geomet 360	Primer	EU71	-	-	11.05	7.05	4	-	70	-	100	CU14/ST15A
DI Water	Thinner	EU71	-	-	8.34	-	-	-	N/A	-	100	CU14/ST15A

**Emission factor for particulate matter (PM) should not include transfer efficiency.*

Section K.5: Hazardous Air Pollutant-containing Coatings/Printing Materials

List each individual hazardous air pollutant (HAP) contained in each material.

Trade Name of Material	HAP Name	HAP CAS #	Identify Solid (*S*) or Volatile (*V*)	HAP % by weight	HAP Emission Factor *(lb/SCC)*	Control Device/ Stack ID
Geomet 360	Methanol	67-56-1	V	3.40%	-	CU17/ST16

Section K.6: Notes, Comments, and Explanations

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007J

Volatile Liquid Storage

___ Section J.1: General Information

___ Section J.2: Tank Description

___ Section J.3: Gasoline Plants and Terminals

___ Section J.4: Loading Rack(s)

___ Section J.5: Equipment Leaks

___ Section J.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

___ SDS attached

Source Name: **Fritz Winter North America, LP**

KY EIS (AFS) #: **21- 213-00064**

Permit #: **V-16-022 R1**

Agency Interest (AI) ID: **129745**

Date: **11/31/2021**

Section J.1: General Information

Emission Unit #	Emission Unit Name	Emission Unit Description	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Date of modification/ reconstruction	Control Device ID	Stack ID
EU75	Diesel Storage Tank	1,000 gallon Diesel Storage Tank	Jul-19	N/A	N/A	STTK1

Section J.2: Tank Description

Emission Point #: STTK1

Emission Point Name: Diesel Storage Tank Vent

Tank ID#: EU75

Date Installed: Jul-19

List Applicable Regulations: 401 KAR 51:017, Prevention of significant deterioration of air quality

J.2A: Stored Liquid Data:

Single or Multi-Component Liquid Name(s)	Maximum Annual Throughput *(gal/yr)*	Liquid Density *(lb/gal)*	Molecular Weight of Single or Multi-Component Liquid	Percent Composition of Multi-Component Liquid(s)	Temperature *(°F)*		Vapor Pressure *(psia)*	
					Minimum	Maximum	Minimum	Maximum
Diesel Fuel	24000	6.943	130 lb/lb-mole	N/A	56	65	0.0059	0.0079

J.2B: Tank Data:

Tank Capacity: *(gallons)* 1,000 **Shell Height/ Length:** *(ft)* 11 **Shell Diameter:** *(ft)* 5.7 **Tank Turnovers per Year:** 16

Tank Orientation: ☑ Horizontal ☐ Vertical If Vertical, provide Maximum Liquid Height: *(ft)* _____ Average Liquid Height: *(ft)* 4.16

Shell Color/Shade: ☐ Red ☑ White ☐ Light Gray ☐ Medium Gray ☐ Aluminum Specular ☐ Aluminum Diffuse ☐ Other: _____

Roof Color: ☐ Slack ☑ White ☐ Light Gray ☐ Medium Gray ☐ Aluminum Specular ☐ Aluminum Diffuse ☐ Other: _____

Tank Type: ☑ Fixed Roof ☐ Internal Floating Roof ☐ External Floating Roof ☐ Pressure Tank

J.2C: For Fixed Roof Tanks:

Roof Type: ☐ Dome ☐ Flat ☐ Cone **Dome/Cone Height:** _____ ft **Average Vapor Space Height:** _____ ft

Is Tank Underground?: ☐ Yes ☑ No **Roof Condition:** ☑ Good ☐ Poor **Vacuum Setting:** _____ psig

Is Tank Heated?: ☐ Yes ☑ No **Shell Condition:** ☑ Good ☐ Poor **Pressure Setting:** _____ psig

J.2D: For All Internal Floating Roof Tanks:

Rim Seal Description: ☐ Vapor Mounted Primary ☐ Vapor Mounted Primary plus Secondary Seal ☐ Shoe Mounted ☐ Liquid Mounted Primary ☐ Liquid Mounted Primary plus Secondary Seal ☐ Shoe Mounted plus Secondary Seal

Secondary Seal: ☐ Rim Mounted ☐ Shoe Mounted ☐ None

Internal Shell Condition: ☐ Light Rust ☐ Dense Rust ☐ Gunite-lined **External Shell Condition:** ☐ Good ☐ Poor

Roof Paint Condition: ☐ Good ☐ Poor **Self Supporting Roof?** ☐ Yes ☐ No

Number of Support Columns: _____ **Effective Column Diameter:** _____ ft

J.2E: Deck Data for Internal Floating Roofs:

Length of Deck Seam: _____ ft

Deck Type: ☐ Bolted ☐ Welded

Type of Deck Fitting: ☐ Access Hatch ☐ Ladder Well ☐ Sample Pipe ☐ Sample Well ☐ Vacuum Breaker

Type of Deck Fitting:

☐ Column Well ☐ Roof Leg ☐ Hanger Well ☐ Stub Drain ☐ Automatic Gauge Float Well

Design of each deck fitting:
(diameter sizes, bolted or gasket covers, sliding cover or fabric seal, adjustable or fixed roof leg/hanger well and number)

J.2F: For All External Floating Roof Tanks:

Rim Seal Description:

☐ Vapor Mounted Primary ☐ Vapor Mounted Primary Rim Secondary Seal ☐ Vapor Mounted Prmary with Weather Shield
☐ Liquid Mounted Primary ☐ Liquid Mounted Primary Rim Secondary Seal ☐ Liquid Mounted Primary with Weather Shield
☐ Shoe Mounted Primary ☐ Shoe Mounted Primary Rim Secondary Seal ☐ Shoe Mounted Primary Shoe Secondary

Internal Shell Condition: ☐ Light Rust ☐ Dense Rust ☐ Gunite-lined

Tank Type: ☐ Riveted ☐ Welded

Roof Type: ☐ Pontoon Roof ☐ Double Deck Roof

J.2G: Deck Data for External Floating Roof Tanks:

Type of Deck Fitting:

☐ Access Hatch ☐ Gauge Hatch ☐ Sample Well ☐ Roof Leg ☐ Vacuum Breaker
☐ Guide Pole ☐ Gauge Float ☐ Roof Drain ☐ Rim Vent ☐ Other

Design of each deck fitting:
(diameter sizes, bolted or gasket covers, sliding cover, unslotted or slotted guide pole well, adjusted or fixed roof leg and number of each design)

J.2H: Emissions Data:

Attach SDS/Composition Analysis for Each Component Listed

Process ID	Component Name	Process Name (e.g. Breathing, Working, Cleaning, Flashing Loss(es))	Lost Emissions *(lb/1000 gal)*	Frequency of Occurrence	Determination Methodology for Each Type of Loss*

Section J.3: Gasoline Plants and Terminals

Indicate the percentage of one or more of the following modes of transportation for incoming liquid and outgoing liquid:

	Tank Truck	Trailer	Railcar	Pipeline	Marine Tank	Barge	Other (Specify)
Incoming Liquid Material:							
Outgoing Liquid Material:							

For Gasoline Dispensing Facilities (GDF) only:

Is the loading of gasoline storage tanks at a GDF located at an area source of hazardous air pollutants as defined in 40 CFR 63.2? ☐ Yes ☐ No

Is there the dispensing of gasoline from a fixed storage tank at a GDF into a portable tank for the on-site delivery and subsequent dispensing into gasoline-fueled equipment? ☐ Yes ☐ No

Maximum monthly throughput in gallons: _____

For Bulk Gasoline Plants Only:

Is the maximum calculated design throughput less than 20,000 gallons (75,700 liters) per day? ☐ Yes ☑ No

Is gasoline loaded into cargo tanks for transport to gasoline dispensing facilities? ☐ Yes ☐ No

For Bulk Gasoline Terminals Only:

Is the maximum calculated design throughput equal to or greater than 20,000 gallons (75,700 liters) per day? ☐ Yes ☐ No

Is the terminal located at an area source of hazardous air pollutants as defined in 40 CFR 63.2? ☐ Yes ☐ No

Does the facility load from marine tank vessel loading operations at all loading berths less than 1.6 billion liters (10 M barrels) of gasoline annually and of less than 32 billion liters (200 M barrels) of crude oil annually? ☐ Yes ☐ No

Does the terminal handle any reformatted or oxygenated gasoline containing methyl tertbutyl ether (MTBE), CF? ☐ Yes ☐ No

Indicate the type of vapor control device utilized: ☐ Incinerator ☐ Adsorber ☐ Other

Section J.4: Loading Rack(s)

Emission Point #: _____

Emission Point Name: _____

Loading Rack ID#: _____

Product Type	**Number of Lanes/Rack**	**Number of risers/loading arms per rack**	**Does the petroleum storage capacity exceed 300,000 barrels?** *(Y/N)*	**Time required to load standard size tanker** *(minutes)*	**Barge/Pipeline Unloading Rate** *(barrels/hr)*	**Barge/Pipeline Unloading Rate** *(barrels/yr)*	**Maximum Loaded** *(gal/hr)*	**Maximum Loaded** *(gal/yr)*	**Stack ID**	**Control Device ID**

Section J.5: Equipment Leaks

Emission Point #: _____

Emission Point Name: _____

This section is to be completed for all components of Volatile Liquid Storage Systems that may have leaks.

Equipment Type	Indicate the number of each type of equipment for this emission point		Emission Factor *(lb/SCC units)*		Source of Emission Factor	Total Emissions *(lb/yr)*
	Gasoline	Other (diesel, kerosene, etc.)	Gasoline	Other		
Valves						
Pumps						
Connectors						
Risers/Loading-Arm Valves						
Open-ended Lines						
Other						

Section J.6: Notes, Comments, and Explanations
Capacity changed from 2,000 gallon in air permit to actual 1,000 gallon installed tank

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007EE

Internal Combustion Engines

___ Section EE.1: General Information
___ Section EE.2: Operating Information
___ Section EE.3: Design Information
___ Section EE.4: Fuel Information
___ Section EE.5: Emission Factor Information
___ Section EE.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG

___ Attach EPA certification of the engine

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 11/30/2021

Section EE.1: General Information

Emission Unit #	Emission Unit Name	Control Device ID	Stack ID	Manufacturer	Model Number	Model Year	Date of Manufacture	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Date Reconstructed/ Modified	List Applicable Regulations
EU72	Emergency Generator #1 (750 KW)	N/A	STG1	Caterpillar	C27	2016	2016	09/2016	N/A	401 KAR 51:017 401 KAR 670:005, Sec 2(2)(dddd) 401 KAR 670:005, Sec 2(2)(eeee)
EU73	Emergency Generator #2 (750 KW)	N/A	STG2	Caterpillar	C27	2016	2016	09/2016	N/A	401 KAR 51:017 401 KAR 670:005, Sec 2(2)(dddd) 401 KAR 670:005, Sec 2(2)(eeee)
EU74	Emergency Generator #3 (40 KW)	N/A	STG3	Caterpillar	D40-LC2	2016	2016	09/2016	N/A	401 KAR 51:017 401 KAR 670:005, Sec 2(2)(dddd) 401 KAR 670:005, Sec 2(2)(eeee)

Section EE.2: Operating Information

Emission Unit #	Engine Purpose (Identify if Non-Emergency, Emergency,Fire/Water Pump, Black-start engine for combustion turbine, Engine Testing)	Hours Operated	Is this engine a rental? *(Yes/No)*	Rental Time Period *(hrs)*	Alternate Operating Scenarios (Describe any operating scenarios in which the engine may be used in a different configuration)
EU72	Emergency Generator	100	No	N/A	No
EU73	Emergency Generator	100	No	N/A	No
EU74	Emergency Generator	100	No	N/A	No

Section EE.3: Design Information

Emission Unit #	Engine Type (Identify all that apply: Commercial, Institutional, Stationary, Non-Road)	Ignition Type (Identify if either Compression or Spark Ignition)	Engine Family (Identify all that apply: 2-stroke, 4-stroke, Rich Burn, Lean Burn)	Maximum Engine Power *(bhp)*	Maximum Engine Speed *(rpm)*	Total Displacement *(L)*	Number of Cylinders
EU72	Stationary	Compression	N/A	1050	1800	27	12
EU73	Stationary	Compression	N/A	1050	1800	27	12
EU74	Stationary	Compression	4-stroke	56	1800	4.4	4

Section EE.4: Fuel Information

Emission Unit #	Identify if Primary, Secondary, or Tertiary Fuel	Fuel Type (Identify if Diesel, Gasoline, Natural Gas, Liquefied Petroleum Gas (LPG), Landfill/Digester Gas, or Other)	Fuel Grade	Percent Time Used *(%)*	Maximum Fuel Consumption	Heat Content	Sulfur Content *(%)*	SCC Code	SCC Units
EU72	Primary	Diesel	N/A	100	53.6 gal/hr	0.139 MMBtu/gal	500 ppm	20100102	lb/MMBtu
EU73	Primary	Diesel	N/A	100	53.6 gal/hr	0.139 MMBtu/gal	500 ppm	20100102	lb/MMBtu
EU74	Primary	Diesel	N/A	100	3.7 gal/hr	0.139 MMBtu/gal	500 ppm	20100102	lb/MMBtu

Section EE.5: Emission Factor Information

Emission factors expressed here are based on the potential to emit.

Emission Unit #	Fuel	Pollutant	Emission Factor	Emission Factor Units	Source of Emission Factor
EU72	Diesel	See Emission Calculations	See Emission Calculations	See Emission Calculations	See Emission Calculations
EU73	Diesel	See Emission Calculations	See Emission Calculations	See Emission Calculations	See Emission Calculations
EU74	Diesel	See Emission Calculations	See Emission Calculations	See Emission Calculations	See Emission Calculations

Section EE.6: Notes, Comments, and Explanations

Division for Air Quality

300 Sower Boulevard

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DEP7007GG

Control Equipment

Additional Documentation

___ Complete Sections GG.1 through GG.12, as applicable

___ Attach manufacturer's specifications for each control device

___ Complete DEP7007AI

Source Name: **Fritz Winter North America, LP**

KY EIS (AFS) #: **21- 213-00064**

Permit #: **V-16-022 R1**

Agency Interest (AI) ID: **129745**

Date: **11/30/2021**

Section GG.1: General Information - Control Equipment

Control Device ID #	Control Device Name	Cost	Manufacturer	Model Name/ Serial #	Date Installed	Inlet Gas Stream Data For All Control Devices					Inlet Gas Stream Data For Condensers, Adsorbers, Afterburners, Incinerators, Oxidizers Only			Equipment Operational Data For All Control Devices		
						Temperature (°F)	Flowrate (scfm @ 68°F)	Average Particle Diameter (μm)	Particle Density (lb/ft^3) or Specific Gravity	Gas Density (lb/ft^3)	Gas Moisture Content (%)	Gas Composition	Fan Type	Pressure Drop Range (in. H_2O)	Pollutants Collected/ Controlled	Pollutant Removal (%)
CU01	Melt Baghouse	--	Luehr Filter	3249.01/16	Aug-16	90.0	154181	N/K	N/K	N/K	N/A	N/A	N/A	0.5-12.0	Particulate Matter	99.5+ est.
CU02	Melt and Core/Mold Baghouse	--	Luehr Filter	Custom Fabrication	Aug-16	70.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.
CU03	Mold Silica Sand Silo Bin Vent Filter	--	Sand Mold Systems	Custom Fabrication	Aug-16	70.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.
CU04	Blend Silo Bin Vent Filter	--	Sand Mold Systems	Custom Fabrication	Aug-16	70.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.
CU05	Bentonite Silo Bin Vent Filter	--	Sand Mold Systems	Custom Fabrication	Aug-16	70.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.
CU06	Sand Plant Baghouse	--	Luehr Filter	3249.02/16	Aug-16	85.0	102110	N/K	N/K	N/K	N/A	N/A	N/A	0.5-12.0	Particulate Matter	99.5+ est.
CU07	Acid Scrubber	--	BGT	GKX 24	Aug-16	70.0	7500	N/K	N/K	N/K	N/A	N/A	N/A	0.25-8.0	Amine Gas	98+
CU08	Core/Mold Baghouse	--	Luehr Filter	3249.04/16	Oct-18	90.0	110818	N/K	N/K	N/K	N/A	N/A	N/A	0.5-12.0	Particulate Matter	99.5+ est.
CU10	Sand Plant Baghouse Waste Sand Silo	--	Sand Mold Systems	Custom Fabrication	Aug-16	70	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.

Division for Air Quality

300 Sower Boulevard

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Control Equipment

Additional Documentation

___ Complete Sections GG.1 through GG.12, as applicable

___ Attach manufacturer's specifications for each control device

___ Complete DEP7007AI

Source Name: **Fritz Winter North America, LP**

KY EIS (AFS) #: **21- 213-00064**

Permit #: **V-16-022 R1**

Agency Interest (AI) ID: **129745**

Date: **11/30/2021**

Section GG.1: General Information - Control Equipment

Control Device ID #	Control Device Name	Cost	Manufacturer	Model Name/ Serial #	Date Installed	Inlet Gas Stream Data For All Control Devices					Inlet Gas Stream Data For Condensers, Adsorbers, Afterburners, Incinerators, Oxidizers Only			Equipment Operational Data For All Control Devices		
						Temperature (°F)	Flowrate (scfm @ 68 °F)	Average Particle Diameter (μm)	Particle Density (lb/ft^3) or Specific Gravity	Gas Density (lb/ft^3)	Gas Moisture Content (%)	Gas Composition	Fan Type	Pressure Drop Range (in. H_2O)	Pollutants Collected/ Controlled	Pollutant Removal (%)
CU11	Fettling Baghouse	--	Luehr Filter	3249.03/16	Aug-16	75	64393	N/K	N/K	N/K	N/A	N/A	N/A	0.5-12	Particulate Matter	99.5+ est.
CU12	Fettling Baghouse Waste Dust Silo Bin Vent Filter	--	Luehr Filter	Custom Fabrication	Apr-17	70	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.
CU13a-CU13h	Machining Cartridge Filters	--	EMAG	VL8	Jun-17	70	11768	N/K	N/K	N/K	N/A	N/A	N/A	0.1-6.0	Particulate Matter	99.5+ est.
CU13j	Perforation Line #2 Cartridge Collector	--	Sturm	ZS16	Sep-18	70	5884	N/K	N/K	N/K	N/A	N/A	N/A	0.1-6.0	Particulate Matter	99.5+ est.
CU14	Paint Line #3 Booth Filter	--	Sturm	ZS16	Sep-18	90	2650	N/K	N/K	N/K	N/A	N/A	N/A	602 (1.5 bar)	Particulate Matter	99.5+ est.
CU15	Paint Line #2 Booth Filter	--	Sturm	ZS16	Nov-17	90	3373	N/K	N/K	N/K	N/A	N/A	N/A	602 (1.5 bar)	Particulate Matter	99.5+ est.
CU17	Paint Line #1 Booth Filter	--	Sturm	ZS16	Mar-17	90	19571	N/K	N/K	N/K	N/A	N/A	N/A	602 (1.5 bar)	Particulate Matter	99.5+ est.
CU19	Core Silica Sand Silo A Bin Vent Filter	--			Feb-17	70.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.
CU20	Core Silica Sand Silo B Bin Vent Filter	--			Feb-17	70.0	600	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0 (when operating)	Particulate Matter	99.5+ est.

Division for Air Quality

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Control Equipment

Additional Documentation

___ Complete Sections GG.1 through GG.12, as applicable

___ Attach manufacturer's specifications for each control device

___ Complete DEP7007AI

Source Name: **Fritz Winter North America, LP**

KY EIS (AFS) #: **21- 213-00064**

Permit #: **V-16-022 R1**

Agency Interest (AI) ID: **129745**

Date: **4/5/2021**

Section GG.1: General Information - Control Equipment

Control Device ID #	Control Device Name	Cost	Manufacturer	Model Name/ Serial #	Date Installed	Inlet Gas Stream Data For All Control Devices					Inlet Gas Stream Data For Condensers, Adsorbers, Afterburners, Incinerators, Oxidizers Only			Equipment Operational Data For All Control Devices		
						Temperature (°F)	Flowrate (scfm @ 68°F)	Average Particle Diameter (μm)	Particle Density (lb/ft^3) or Specific Gravity	Gas Density (lb/ft^3)	Gas Moisture Content (%)	Gas Composition	Fan Type	Pressure Drop Range (in. H_2O)	Pollutants Collected/ Controlled	Pollutant Removal (%)
CU21	Snag Grinder #1 Fabric Filter	-				70	Passive	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0	Particulate Matter	99.5+ est.
CU22	Snag Grinder #2 Fabric Filter	-				70	Passive	N/K	N/K	N/K	N/A	N/A	N/A	0.1-4.0	Particulate Matter	99.5+ est.

Section GG.5: Scrubber

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Scrubber	Identify Type of Scrubber: Venturi, Packed Bed, Spray Tower, or Other (specify)	For Venturi Scrubbers:	For Packed Bed Scrubbers:		For Spray Towers:		Identify Type of Flow: Concurrent, Countercurrent, or Crossflow	Length in Direction of Gas Flow (ft)	Cross-Sectional Area (ft^2)	Venturi Throat Velocity (ft/s)	Mist Eliminator			Scrubbing Liquid			
			Identify Throat Type: Fixed or Adjustable	Identify Packing Type	Packing Height (in)	Number of Nozzles	Nozzle Pressure (psig)					Identify Type: Mesh or Vane	Cross-Sectional Area (ft^2)	Pressure Drop (in. H_2O)	Chemical Composition	Flowrate (gal/min)	Fresh Liquid Makeup Rate (gal/min)	Describe Disposal Method of Scrubber Effluent
CU07	EU39 (blower), EU40 (blower)	Packed Bed	NA	VSP 50	157.48	NA	NA	Countercurrent	26.1	48.69	NA	NA	NA	NA	H_2SO_4	176.11	1.76	Auto-discharge into a tote (IBC)

Section GG.6: Filter

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Filter	Identify Type of Filter Unit: Baghouse, Cartridge Collector, or Other (specify)	Identify Type of Filtering Material: Fabric, Paper, Synthetic, or Other (specify)	Total Filter Area (ft^2)	Effective Air-to-Filter Ratio ($acfm/ft^2$)	Continuous Monitoring Instrumentation (e.g. COMS, BLDS, none)	Additional Materials Introduced into the Control System (e.g. lime, carbon)		Identify Cleaning Method: Shaker, Pulse Air, Reverse Air, Pulse Jet, or Other (specify)	Identify Gas Cooling Method: Ductwork, Heat Exchanger, Bleed-in Air, Water Spray, or Other (specify)	For Ductwork:		For Bleed-in Air:	For Water Spray:
							Material	Injection Rate (lb/hr)			Length (ft)	Diameter (ft)	Flowrate (scfm @ 68°F)	Flowrate (gal/min)
CU01	EU01 (secondary), EU05 (sec), EU06(sec), EU07, EU08, EU09, EU10, EU13 (sec), EU18 (sec)	Baghouse	Fabric			BLDS Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU02	EU17	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU03	EU19	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU04	EU20	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU05	EU21	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU06	EU22, EU53	Baghouse	Fabric			BLDS Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU08	EU33, EU35A (sec), EU35B (sec), EU36, EU39 (mixer), EU40 (mixer), EU43 (sec), EU44, EU45, EU50, EU52, EU59, EU79 (sec), EU83	Baghouse	Fabric			BLDS Magnahelic	NA	NA	Pulse Jet	NA	NK	NK	NA	NA
CU10	EU57	Bin Vent Filter	Fabric			Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA

Section GG.6: Filter

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Filter	Identify Type of Filter Unit: Baghouse, Cartridge Collector, or Other (specify)	Identify Type of Filtering Material: Fabric, Paper, Synthetic, or Other (specify)	Total Filter Area (ft^2)	Effective Air-to-Filter Ratio ($acfm/ft^2$)	Continuous Monitoring Instrumentation (e.g. COMS, BLDS, none)	Additional Materials Introduced into the Control System (e.g. lime, carbon)		Identify Cleaning Method: Shaker, Pulse Air, Reverse Air, Pulse Jet, or Other (specify)	Identify Gas Cooling Method: Ductwork, Heat Exchanger, Bleed-in Air, Water Spray, or Other (specify)	For Ductwork:		For Bleed-in Air:	For Water Spray:
							Material	Injection Rate (lb/hr)			Length (ft)	Diameter (ft)	Flowrate (scfm @ 68°F)	Flowrate (gal/min)
CU11	EU60 (sec), EU61, EU64, EU65, EU77 (sec), EU78 (sec), EU83	Baghouse	Fabric			BLDS	NA	NA	Pulse Jet	Ductwork			NA	NA
CU12	EU63	Bin Vent Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA
CU13 a-h	EU66	Cartridge Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA
CU13j	EU67	Cartridge Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA
CU13i	EU84	Cartridge Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA
CU14	EU68	Paint Booth Filter				Magnahelic	NA	NA	None	NA	NA	NA	NA	NA
CU15	EU69	Paint Booth Filter				Magnahelic	NA	NA	None	NA	NA	NA	NA	NA
CU17	EU66 (sec), EU67 (sec), EU71, EU82 (sec)	Paint Booth Filter				Magnahelic	NA	NA	None	NA	NA	NA	NA	NA
CU19	EU35A	Bin Vent Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA
CU20	EU35B	Bin Vent Filter				Magnahelic	NA	NA	Pulse Jet	NA	NA	NA	NA	NA

Section GG.6: Filter

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Filter	Identify Type of Filter Unit: Baghouse, Cartridge Collector, or Other (specify)	Identify Type of Filtering Material: Fabric, Paper, Synthetic, or Other (specify)	Total Filter Area (ft^2)	Effective Air-to-Filter Ratio ($acfm/ft^2$)	Continuous Monitoring Instrumentation (e.g. COMS, BLDS, none)	Additional Materials Introduced into the Control System (e.g. lime, carbon)		Identify Cleaning Method: Shaker, Pulse Air, Reverse Air, Pulse Jet, or Other (specify)	Identify Gas Cooling Method: Ductwork, Heat Exchanger, Bleed-in Air, Water Spray, or Other (specify)	For Ductwork:		For Bleed-in Air:	For Water Spray:
							Material	Injection Rate (lb/hr)			Length (ft)	Diameter (ft)	Flowrate (scfm @ 68°F)	Flowrate (gal/min)
CU21	EU77	Fabric Filter	Fabric	NK	NK	None	NA	NA	N/A	NA	-	-	NA	NA
CU22	EU78	Fabric Filter	Fabric	NK	NK	None	NA	NA	N/A	NA	-	-	NA	NA

Section GG.12: Notes, Comments, and Explanations

Added Passive Filters for Snag Grinders (EU77 and EU78); vent inside building and exhaust via ST12

CU13a-j vent inside building and vent to atmosphere via stack ST16

CU19 and CU20 vent inside the building and vent to atmosphere via stack ST09

Particulate emissions from EU83 are controlled by both CU08 and CU11

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Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU01	Charge Handling	EU01	Charge Handling	Melt Baghouse	CU01	ST02	15	PM	0.070	Published Industry Paper (Gutow)	100	94.79%	1.050	0.055	2.800	0.146
EU01	Charge Handling	EU01	Charge Handling	Melt Baghouse	CU01	ST02	15	PM_{10}	0.070	Published Industry Paper (Gutow)	100	94.55%	1.050	0.057	2.800	0.153
EU01	Charge Handling	EU01	Charge Handling	Melt Baghouse	CU01	ST02	15	$PM_{2.5}$	0.060	Gutow and EPA PM Calculator	100	94.43%	0.900	0.050	2.400	0.134

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Source Emissions Profile

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Additional Documentation

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Source Name: Fritz Winter North America, LP
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Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU05	Refractory Burner #1	EU05	Refractory Burner #1	Melt Baghouse	CU01	ST02	0.008 MMscf	PM	7.6	AP-42	100	94.79%	0.063	0.003	0.277	0.014
EU05	Refractory Burner #1	EU05	Refractory Burner #1	Melt Baghouse	CU01	ST02	0.008 MMscf	PM_{10}	7.6	AP-42	100	94.55%	0.063	0.003	0.277	0.015
EU05	Refractory Burner #1	EU05	Refractory Burner #1	Melt Baghouse	CU01	ST02	0.008 MMscf	$PM_{2.5}$	7.6	AP-42	100	94.43%	0.063	0.004	0.277	0.015
EU05	Refractory Burner #1	EU05	Refractory Burner #1	Melt Baghouse	CU01	ST02	0.008 MMscf	SOX	0.6	AP-42	100	0.00%	0.005	0.005	0.022	0.022
EU05	Refractory Burner #1	EU05	Refractory Burner #1	Melt Baghouse	CU01	ST02	0.008 MMscf	NOX	100	AP-42	100	0.00%	0.833	0.833	3.650	3.650
EU05	Refractory Burner #1	EU05	Refractory Burner #1	Melt Baghouse	CU01	ST02	0.008 MMscf	VOC	5.5	AP-42	100	0.00%	0.046	0.046	0.201	0.201
EU05	Refractory Burner #1	EU05	Refractory Burner #1	Melt Baghouse	CU01	ST02	0.008 MMscf	CO	84	AP-42	100	0.00%	0.700	0.700	3.066	3.066
EU05	Refractory Burner #1	EU05	Refractory Burner #1	Melt Baghouse	CU01	ST02	0.008 MMscf	Pb	5.00E-04	AP-42	100	94.79%	4.17E-06	2.17E-07	1.83E-05	9.51E-07

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Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
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__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU06	Refractory Burner #2	EU06	Refractory Burner #2	Melt Baghouse	CU01	ST02	0.008 MMscf	PM	7.6	AP-42	100	94.79%	0.063	0.003	0.277	0.014
EU06	Refractory Burner #2	EU06	Refractory Burner #2	Melt Baghouse	CU01	ST02	0.008 MMscf	PM_{10}	7.6	AP-42	100	94.55%	0.063	0.003	0.277	0.015
EU06	Refractory Burner #2	EU06	Refractory Burner #2	Melt Baghouse	CU01	ST02	0.008 MMscf	$PM_{2.5}$	7.6	AP-42	100	94.43%	0.063	0.004	0.277	0.015
EU06	Refractory Burner #2	EU06	Refractory Burner #2	Melt Baghouse	CU01	ST02	0.008 MMscf	SOX	0.6	AP-42	100	0.00%	0.005	0.005	0.022	0.022
EU06	Refractory Burner #2	EU06	Refractory Burner #2	Melt Baghouse	CU01	ST02	0.008 MMscf	NOX	100	AP-42	100	0.00%	0.833	0.833	3.650	3.65
EU06	Refractory Burner #2	EU06	Refractory Burner #2	Melt Baghouse	CU01	ST02	0.008 MMscf	VOC	5.5	AP-42	100	0.00%	0.046	0.046	0.201	0.201
EU06	Refractory Burner #2	EU06	Refractory Burner #2	Melt Baghouse	CU01	ST02	0.008 MMscf	CO	84	AP-42	100	0.00%	0.700	0.700	3.066	3.066
EU06	Refractory Burner #2	EU06	Refractory Burner #2	Melt Baghouse	CU01	ST02	0.008 MMscf	Pb	5.00E-04	AP-42	100	94.79%	4.17E-06	2.17E-07	1.83E-05	9.51E-07

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Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU07	Induction Furnace #1	EU07	Induction Furnace #1	Melt Baghouse	CU01	ST02	10 tons	PM	0.90	WebFIRE	100	94.79%	9.000	0.469	9.000	0.469
EU07	Induction Furnace #1	EU07	Induction Furnace #1	Melt Baghouse	CU01	ST02	10 tons	PM_{10}	0.86	AP-42	100	94.55%	8.600	0.469	8.600	0.469
EU07	Induction Furnace #1	EU07	Induction Furnace #1	Melt Baghouse	CU01	ST02	10 tons	$PM_{2.5}$	0.85	AP-42	100	94.43%	8.460	0.471	8.460	0.471
EU07	Induction Furnace #1	EU07	Induction Furnace #1	Melt Baghouse	CU01	ST02	10 tons	VOC	0.23	AP-42	100	0.00%	2.341	2.341	2.341	2.341
EU07	Induction Furnace #1	EU07	Induction Furnace #1	Melt Baghouse	CU01	ST02	10 tons	CO	1.39	AP-42	100	0.00%	13.944	13.944	13.944	13.944
EU07	Induction Furnace #1	EU07	Induction Furnace #1	Melt Baghouse	CU01	ST02	10 tons	Pb	0.014	Industry Test	100	94.79%	0.140	0.007	0.140	0.007

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___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU08	Induction Furnace #2	EU08	Induction Furnace #2	Melt Baghouse	CU01	ST02	10 tons	PM	0.90	WebFIRE	100	94.79%	9	0.469	9.000	0.469
EU08	Induction Furnace #2	EU08	Induction Furnace #2	Melt Baghouse	CU01	ST02	10 tons	PM10	0.86	AP-42	100	94.55%	8.6	0.469	8.600	0.469
EU08	Induction Furnace #2	EU08	Induction Furnace #2	Melt Baghouse	CU01	ST02	10 tons	PM2.5	0.85	AP-42	100	94.43%	8.46	0.471	8.460	0.471
EU08	Induction Furnace #2	EU08	Induction Furnace #2	Melt Baghouse	CU01	ST02	10 tons	VOC	0.23	AP-42	100	0.00%	2.341	2.341	2.341	2.341
EU08	Induction Furnace #2	EU08	Induction Furnace #2	Melt Baghouse	CU01	ST02	10 tons	CO	1.39	AP-42	100	0.00%	13.944	13.944	13.944	13.944
EU08	Induction Furnace #2	EU08	Induction Furnace #2	Melt Baghouse	CU01	ST02	10 tons	Pb	0.014	Industry Test	100	94.79%	0.14	0.007	0.14	0.007

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Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU09	Induction Furnace #3	EU09	Induction Furnace #3	Melt Baghouse	CU01	ST02	10 tons	PM	0.90	WebFIRE	100	94.79%	9	0.469	9.000	0.469
EU09	Induction Furnace #3	EU09	Induction Furnace #3	Melt Baghouse	CU01	ST02	10 tons	PM10	0.86	AP-42	100	94.55%	8.6	0.469	8.600	0.469
EU09	Induction Furnace #3	EU09	Induction Furnace #3	Melt Baghouse	CU01	ST02	10 tons	PM2.5	0.85	AP-42	100	94.43%	8.46	0.471	8.460	0.471
EU09	Induction Furnace #3	EU09	Induction Furnace #3	Melt Baghouse	CU01	ST02	10 tons	VOC	0.23	AP-42	100	0.00%	2.341	2.341	2.341	2.341
EU09	Induction Furnace #3	EU09	Induction Furnace #3	Melt Baghouse	CU01	ST02	10 tons	CO	1.39	AP-42	100	0.00%	13.944	13.944	13.944	13.944
EU09	Induction Furnace #3	EU09	Induction Furnace #3	Melt Baghouse	CU01	ST02	10 tons	Pb	0.014	Industry Test	100	94.79%	0.14	0.007	0.14	0.007

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Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU10	Induction Furnace #4	EU10	Induction Furnace #4	Melt Baghouse	CU01	ST02	10 tons	PM	0.90	WebFIRE	100	94.79%	9.000	0.469	9.000	0.469
EU10	Induction Furnace #4	EU10	Induction Furnace #4	Melt Baghouse	CU01	ST02	10 tons	PM10	0.86	AP-42	100	94.55%	8.600	0.469	8.600	0.469
EU10	Induction Furnace #4	EU10	Induction Furnace #4	Melt Baghouse	CU01	ST02	10 tons	PM2.5	0.85	AP-42	100	94.43%	8.460	0.471	8.460	0.471
EU10	Induction Furnace #4	EU10	Induction Furnace #4	Melt Baghouse	CU01	ST02	10 tons	VOC	0.23	AP-42	100	0.00%	2.341	2.341	2.341	2.341
EU10	Induction Furnace #4	EU10	Induction Furnace #4	Melt Baghouse	CU01	ST02	10 tons	CO	1.39	AP-42	100	0.00%	13.944	13.944	13.944	13.944
EU10	Induction Furnace #4	EU10	Induction Furnace #4	Melt Baghouse	CU01	ST02	10 tons	Pb	0.014	Industry Test	100	94.79%	0.140	0.007	0.140	0.007
EU13	Hot Metal Transfer	EU13	Hot Metal Transfer	Melt Baghouse	CU01	ST02	15 tons	PM	0.056	AP-42	100	94.79%	0.840	0.044	2.240	0.117
EU13	Hot Metal Transfer	EU13	Hot Metal Transfer	Melt Baghouse	CU01	ST02	15 tons	PM10	0.052	AP-42 and EPA PM Calculator	100	94.55%	0.773	0.042	2.061	0.112
EU13	Hot Metal Transfer	EU13	Hot Metal Transfer	Melt Baghouse	CU01	ST02	15 tons	PM2.5	0.046	AP-42 and EPA PM Calculator	100	94.43%	0.689	0.038	1.837	0.102

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Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU15	Pouring Furnace #1	EU15	Pouring Furnace #1	Melt Baghouse	CU01	ST02	0.0029 MMscf	PM	7.6	AP-42	100	94.79%	0.022	0.001	0.095	0.005
EU15	Pouring Furnace #1	EU15	Pouring Furnace #1	Melt Baghouse	CU01	ST02	0.0029 MMscf	PM_{10}	7.6	AP-42	100	94.55%	0.022	0.001	0.095	0.005
EU15	Pouring Furnace #1	EU15	Pouring Furnace #1	Melt Baghouse	CU01	ST02	0.0029 MMscf	$PM_{2.5}$	7.6	AP-42	100	94.43%	0.022	0.001	0.095	0.005
EU15	Pouring Furnace #1	EU15	Pouring Furnace #1	Melt Baghouse	CU01	ST02	0.0029 MMscf	SOX	0.6	AP-42	100	0.00%	0.002	0.002	0.007	0.007
EU15	Pouring Furnace #1	EU15	Pouring Furnace #1	Melt Baghouse	CU01	ST02	0.0029 MMscf	NOX	100	AP-42	100	0.00%	0.285	0.285	1.250	1.250
EU15	Pouring Furnace #1	EU15	Pouring Furnace #1	Melt Baghouse	CU01	ST02	0.0029 MMscf	VOC	5.5	AP-42	100	0.00%	0.016	0.016	0.069	0.069
EU15	Pouring Furnace #1	EU15	Pouring Furnace #1	Melt Baghouse	CU01	ST02	0.0029 MMscf	CO	84	AP-42	100	0.00%	0.240	0.240	1.050	1.050
EU15	Pouring Furnace #1	EU15	Pouring Furnace #1	Melt Baghouse	CU01	ST02	0.0029 MMscf	Pb	5.00E-04	AP-42	100	94.79%	1.43E-06	7.43E-08	6.25E-06	3.26E-07

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N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU17	Melt and Core/Mold Baghouse Dust Silo	EU17	Melt and Core/Mold Baghouse Dust Silo	Melt and Core/Mold Baghouse Dust Silo Bin Vent	CU02	ST03	0.38 tons	PM	0.24	Ohio EPA RACM Guide	100	83.08%	0.091	0.015	0.399	0.067
EU17	Melt and Core/Mold Baghouse Dust Silo	EU17	Melt and Core/Mold Baghouse Dust Silo	Melt and Core/Mold Baghouse Dust Silo Bin Vent	CU02	ST03	0.38 tons	PM_{10}	0.24	Ohio EPA RACM Guide	100	83.08%	0.091	0.015	0.399	0.067
EU17	Melt and Core/Mold Baghouse Dust Silo	EU17	Melt and Core/Mold Baghouse Dust Silo	Melt and Core/Mold Baghouse Dust Silo Bin Vent	CU02	ST03	0.38 tons	$PM_{2.5}$	0.24	Ohio EPA RACM Guide	100	83.08%	0.092	0.015	0.399	0.067

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Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU18	Refractory Curing Mobile Burner	EU18	Refractory Curing Mobile Burner	Melt Baghouse	CU01	ST02	0.002 MMscf	PM	7.6	AP-42	100	94.79%	0.015	0.001	0.065	0.003
EU18	Refractory Curing Mobile Burner	EU18	Refractory Curing Mobile Burner	Melt Baghouse	CU01	ST02	0.002 MMscf	PM_{10}	7.6	AP-42	100	94.55%	0.015	0.001	0.065	0.004
EU18	Refractory Curing Mobile Burner	EU18	Refractory Curing Mobile Burner	Melt Baghouse	CU01	ST02	0.002 MMscf	$PM_{2.5}$	7.6	AP-42	100	94.43%	0.015	0.001	0.065	0.004
EU18	Refractory Curing Mobile Burner	EU18	Refractory Curing Mobile Burner	Melt Baghouse	CU01	ST02	0.002 MMscf	SOX	0.6	AP-42	100	0.00%	0.001	0.001	0.005	0.005
EU18	Refractory Curing Mobile Burner	EU18	Refractory Curing Mobile Burner	Melt Baghouse	CU01	ST02	0.002 MMscf	NOX	100	AP-42	100	0.00%	0.196	0.196	0.859	0.859
EU18	Refractory Curing Mobile Burner	EU18	Refractory Curing Mobile Burner	Melt Baghouse	CU01	ST02	0.002 MMscf	VOC	5.5	AP-42	100	0.00%	0.011	0.011	0.047	0.047
EU18	Refractory Curing Mobile Burner	EU18	Refractory Curing Mobile Burner	Melt Baghouse	CU01	ST02	0.002 MMscf	CO	84	AP-42	100	0.00%	0.165	0.165	0.721	0.721
EU18	Refractory Curing Mobile Burner	EU18	Refractory Curing Mobile Burner	Melt Baghouse	CU01	ST02	0.002 MMscf	Pb	5.00E-04	AP-42	100	93.05%	9.80E-07	5.11E-08	4.29E-06	2.24E-07

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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
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Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU19	Mold Silica Sand Silo	EU19	Mold Silica Sand Silo	Mold Silica Sand Silo Bin Vent Filter	CU03	ST04	25 tons	PM	0.24	Ohio EPA RACM Guide	100	99.74%	6.000	0.016	2.520	0.007
EU19	Mold Silica Sand Silo	EU19	Mold Silica Sand Silo	Mold Silica Sand Silo Bin Vent Filter	CU03	ST04	25 tons	PM_{10}	0.24	Ohio EPA RACM Guide	100	99.74%	6.000	0.016	2.520	0.007
EU19	Mold Silica Sand Silo	EU19	Mold Silica Sand Silo	Mold Silica Sand Silo Bin Vent Filter	CU03	ST04	25 tons	$PM_{2.5}$	0.24	Ohio EPA RACM Guide	100	99.74%	6.000	0.016	2.520	0.007
EU20	Blend Silo	EU20	Blend Silo	Blend Silo Bin Vent Filter	CU04	ST05	25 tons	PM	0.24	Ohio EPA RACM Guide	100	99.74%	6.000	0.016	0.660	0.002
EU20	Blend Silo	EU20	Blend Silo	Blend Silo Bin Vent Filter	CU04	ST05	25 tons	PM_{10}	0.24	Ohio EPA RACM Guide	100	99.74%	6.000	0.016	0.660	0.002
EU20	Blend Silo	EU20	Blend Silo	Blend Silo Bin Vent Filter	CU04	ST05	25 tons	$PM_{2.5}$	0.24	Ohio EPA RACM Guide	100	99.74%	6.000	0.016	0.660	0.002

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Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU21	Bentonite Silo	EU21	Bentonite Silo	Bentonite Silo Bin Vent Filter	CU05	ST06	25 tons	PM	0.24	Ohio EPA RACM Guide	100	99.74%	6.000	0.016	0.420	0.001
EU21	Bentonite Silo	EU21	Bentonite Silo	Bentonite Silo Bin Vent Filter	CU05	ST06	25 tons	PM_{10}	0.24	Ohio EPA RACM Guide	100	99.74%	6.000	0.016	0.420	0.001
EU21	Bentonite Silo	EU21	Bentonite Silo	Bentonite Silo Bin Vent Filter	CU05	ST06	25 tons	$PM_{2.5}$	0.24	Ohio EPA RACM Guide	100	99.74%	6.000	0.016	0.420	0.001
EU22	Mold Sand Handling and Preparation	EU22	Mold Sand Handling and Preparation	Sand Plant Baghouse	CU06	ST07	198 tons	PM	3.6	WebFIRE	100	99.77%	712.800	1.639	1290.168	2.967
EU22	Mold Sand Handling and Preparation	EU22	Mold Sand Handling and Preparation	Sand Plant Baghouse	CU06	ST07	198 tons	PM_{10}	0.54	WebFIRE	100	98.75%	106.920	1.337	193.525	2.419
EU22	Mold Sand Handling and Preparation	EU22	Mold Sand Handling and Preparation	Sand Plant Baghouse	CU06	ST07	198 tons	$PM_{2.5}$	0.54	WebFIRE	100	98.62%	106.920	1.475	193.525	2.671

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Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU33	Mold Making #1	EU33	Mold Making #1	Core/Mold Baghouse	CU08	ST09	15 tph iron	PM	0.04	Ohio EPA RACM	100	84.26%	0.600	0.094	1.600	0.252
EU33	Mold Making #1	EU33	Mold Making #1	Core/Mold Baghouse	CU08	ST09	15 tph iron	PM_{10}	0.04	Ohio EPA RACM	100	83.63%	0.600	0.098	1.600	0.262
EU33	Mold Making #1	EU33	Mold Making #1	Core/Mold Baghouse	CU08	ST09	15 tph iron	$PM_{2.5}$	0.04	Ohio EPA RACM	100	80.91%	0.600	0.115	1.600	0.305
EU35A	Core Silica Sand Silo A	EU35A	Core Silica Sand Silo A	Core Silia Sand Silo A Bin Vent Filter	CU19 CU08 (sec)	ST09	25 tons	PM	0.24	Ohio EPA RACM Guide	100	99.00%	6.000	0.060	0.401	0.004
EU35A	Core Silica Sand Silo A	EU35A	Core Silica Sand Silo A	Core Silia Sand Silo A Bin Vent Filter	CU19 CU08 (sec)	ST09	25 tons	PM_{10}	0.24	Ohio EPA RACM Guide	100	99.00%	6.000	0.060	0.401	0.004
EU35A	Core Silica Sand Silo A	EU35A	Core Silica Sand Silo A	Core Silia Sand Silo A Bin Vent Filter	CU19 CU08 (sec)	ST09	25 tons	$PM_{2.5}$	0.24	Ohio EPA RACM Guide	100	99.00%	6.000	0.060	0.401	0.004
EU35B	Core Silica Sand Silo B	EU35B	Core Silica Sand Silo B	Core Silia Sand Silo B Bin Vent Filter	CU20 CU08 (sec)	ST09	25 tons	$PM_{2.5}$	0.24	Ohio EPA RACM Guide	100	99.00%	6.000	0.060	0.401	0.004
EU35B	Core Silica Sand Silo B	EU35B	Core Silica Sand Silo B	Core Silia Sand Silo B Bin Vent Filter	CU20 CU08 (sec)	ST09	25 tons	$PM_{2.5}$	0.24	Ohio EPA RACM Guide	100	99.00%	6.000	0.060	0.401	0.004
EU35B	Core Silica Sand Silo B	EU35B	Core Silica Sand Silo B	Core Silia Sand Silo B Bin Vent Filter	CU20 CU08 (sec)	ST09	25 tons	$PM_{2.5}$	0.24	Ohio EPA RACM Guide	100	99.00%	6.000	0.060	0.401	0.004

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Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU36	Core Sand Handling and Preparatiion	EU36	Core Sand Handling and Preparatiion	Core/Mold Baghouse	CU08	ST09	1.86 tons	PM	0.65	AIRS	100	84.26%	1.209	0.190	2.174	0.342
EU36	Core Sand Handling and Preparatiion	EU36	Core Sand Handling and Preparatiion	Core/Mold Baghouse	CU08	ST09	1.86 tons	PM_{10}	0.54	WebFIRE	100	83.63%	1.004	0.164	1.806	0.296
EU36	Core Sand Handling and Preparatiion	EU36	Core Sand Handling and Preparatiion	Core/Mold Baghouse	CU08	ST09	1.86 tons	$PM_{2.5}$	0.54	WebFIRE	100	80.91%	1.004	0.192	1.806	0.345

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___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU39-res	PUCB Core Machine #1	EU39-res	PUCB Core Machine #1	Core/Mold Baghouse	CU08	ST09	0.93 tons	PM	0.3	Ohio EPA RACM	100	84.26%	0.278	0.044	0.502	0.079
EU39-res	PUCB Core Machine #1	EU39-res	PUCB Core Machine #1	Core/Mold Baghouse	CU08	ST09	0.93 tons	PM_{10}	0.3	Ohio EPA RACM	100	83.63%	0.278	0.045	0.502	0.082
EU39-res	PUCB Core Machine #1	EU39-res	PUCB Core Machine #1	Core/Mold Baghouse	CU08	ST09	0.93 tons	$PM_{2.5}$	0.3	Ohio EPA RACM	100	80.91%	0.278	0.053	0.502	0.096
EU39-res	PUCB Core Machine #1	EU39-res	PUCB Core Machine #1	Core/Mold Baghouse	CU08	ST09	0.93 tons	VOC	0.0047	Vendor	100	0.00%	0.104	0.104	0.189	0.189
EU39-r+c	PUCB Core Machine #1	EU39-r+c	PUCB Core Machine #1	Acid Scrubber	CU07	ST08	0.93 tons	$PM/PM_{10}/PM2.5$	0.35	Ohio EPA RACM	100	95.13%	0.324	0.016	0.585	0.029
EU39-r+c	PUCB Core Machine #1	EU39-r+c	PUCB Core Machine #1	Core/Mold Baghouse	CU07	ST08	22.20 lbs	VOC	0.028	Mass Balance	100	0.00%	8.569	0.624	15.494	1.128
EU39-rel	PUCB Core Machine #1	EU39-rel	PUCB Core Machine #1	Core/Mold Baghouse	CU07	ST08	0.0021 tons	VOC	1700	Mass Balance	100	0.00%	3.570	3.570	6.545	6.545

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Source Name: Fritz Winter North America, LP
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Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU40-res	PUCB Core Machine #2	EU40-res	PUCB Core Machine #2	Core/Mold Baghouse	CU08	ST09	0.93 tons	PM	0.3	Ohio EPA RACM	100	84.26%	0.278	0.044	0.502	0.079
EU40-res	PUCB Core Machine #2	EU40-res	PUCB Core Machine #2	Core/Mold Baghouse	CU08	ST09	0.93 tons	PM10	0.3	Ohio EPA RACM	100	83.63%	0.278	0.045	0.502	0.082
EU40-res	PUCB Core Machine #2	EU40-res	PUCB Core Machine #2	Core/Mold Baghouse	CU08	ST09	0.93 tons	PM2.5	0.3	Ohio EPA RACM	100	80.91%	0.278	0.053	0.502	0.096
EU40-res	PUCB Core Machine #2	EU40-res	PUCB Core Machine #2	Core/Mold Baghouse	CU08	ST09	0.93 tons	VOC	0.0047	Vendor	100	0.00%	0.104	0.104	0.189	0.189
EU40-r+c	PUCB Core Machine #2	EU40-r+c	PUCB Core Machine #2	Acid Scrubber	CU07	ST08	0.93 tons	PM/PM10/PM2.5	0.35	Ohio EPA RACM	100	95.13%	0.324	0.016	0.585	0.029
EU40-r+c	PUCB Core Machine #2	EU40-r+c	PUCB Core Machine #2	Core/Mold Baghouse	CU07	ST08	22.20 lbs	VOC	0.028	Mass Balance	100	0.00%	8.569	0.624	15.494	1.128
EU40-rel	PUCB Core Machine #2	EU40-rel	PUCB Core Machine #2	Core/Mold Baghouse	CU07	ST08	0.0021 tons	VOC	1700	Mass Balance	100	0.00%	3.570	3.570	6.545	6.545

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Date: Monday, April 12, 2021

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Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU43	Core Wash Station #1	EU43	Core Wash Station #1	Core/Mold Baghouse	CU08	ST09	0.338 tons	VOC	0.10%	Mass Balance	100	0.00%	0.675	0.135	0.675	0.135
EU44	Core Dryer #1	EU44	Core Dryer #1	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	PM	7.6	AP-42	100	84.26%	0.030	0.005	0.131	0.021
EU44	Core Dryer #1	EU44	Core Dryer #1	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	PM_{10}	7.6	AP-42	100	83.63%	0.030	0.005	0.131	0.021
EU44	Core Dryer #1	EU44	Core Dryer #1	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	$PM_{2.5}$	7.6	AP-42	100	80.91%	0.030	0.006	0.131	0.025
EU44	Core Dryer #1	EU44	Core Dryer #1	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	SOX	0.6	AP-42	100	0.00%	0.002	0.002	0.010	0.010
EU44	Core Dryer #1	EU44	Core Dryer #1	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	NOX	100	AP-42	100	0.00%	0.392	0.392	1.718	1.718
EU44	Core Dryer #1	EU44	Core Dryer #1	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	VOC	5.5	AP-42	100	0.00%	0.022	0.022	0.094	0.094
EU44	Core Dryer #1	EU44	Core Dryer #1	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	CO	84	AP-42	100	0.00%	0.329	0.329	1.443	1.443
EU44	Core Dryer #1	EU44	Core Dryer #1	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	Pb	5.00E-04	AP-42	100	84.26%	1.96E-06	3.09E-07	8.59E-06	1.35E-06

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Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU45	Core Dryer #2	EU45	Core Dryer #2	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	PM	7.6	AP-42	100	84.26%	0.03	0.005	0.131	0.021
EU45	Core Dryer #2	EU45	Core Dryer #2	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	PM10	7.6	AP-42	100	83.63%	0.03	0.005	0.131	0.021
EU45	Core Dryer #2	EU45	Core Dryer #2	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	PM2.5	7.6	AP-42	100	80.91%	0.03	0.006	0.131	0.025
EU45	Core Dryer #2	EU45	Core Dryer #2	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	SOX	0.6	AP-42	100	0.00%	0.002	0.002	0.01	0.01
EU45	Core Dryer #2	EU45	Core Dryer #2	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	NOX	100	AP-42	100	0.00%	0.392	0.392	1.718	1.718
EU45	Core Dryer #2	EU45	Core Dryer #2	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	VOC	5.5	AP-42	100	0.00%	0.022	0.022	0.094	0.094
EU45	Core Dryer #2	EU45	Core Dryer #2	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	CO	84	AP-42	100	0.00%	0.329	0.329	1.443	1.443
EU45	Core Dryer #2	EU45	Core Dryer #2	Core/Mold Baghouse	CU08	ST09	0.004 MMscf	Pb	5.00E-04	AP-42	100	84.26%	1.96E-06	3.09E-07	8.59E-06	1.35E-06

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Source Name: Fritz Winter North America, LP
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N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU50	Pouring #1	EU50	Pouring #1	Core/Mold Baghouse	CU08	ST09	15 tons	PM	0.410	Similar Facility Stack Test	100	84.26%	6.150	0.968	16.400	2.581
EU50	Pouring #1	EU50	Pouring #1	Core/Mold Baghouse	CU08	ST09	15 tons	PM_{10}	0.410	Similar Facility Stack Test	100	83.63%	6.150	1.007	16.400	2.685
EU50	Pouring #1	EU50	Pouring #1	Core/Mold Baghouse	CU08	ST09	15 tons	$PM_{2.5}$	0.336	Similar Facility and EPA PM Calculator	100	80.91%	5.043	0.963	13.448	2.567
EU50	Pouring #1	EU50	Pouring #1	Core/Mold Baghouse	CU08	ST09	15 tons	SO_2	0.020	WebFIRE	100	0.00%	0.300	0.300	0.800	0.800
EU50	Pouring #1	EU50	Pouring #1	Core/Mold Baghouse	CU08	ST09	15 tons	NO_2	0.010	WebFIRE	100	0.00%	0.150	0.150	0.400	0.400
EU50	Pouring #1	EU50	Pouring #1	Core/Mold Baghouse	CU08	ST09	15 tons	VOC	3.540	Stack Test	100	0.00%	53.101	53.101	141.604	141.604
EU50	Pouring #1	EU50	Pouring #1	Core/Mold Baghouse	CU08	ST09	15 tons	CO	6.166	Stack Test	100	0.00%	92.488	92.488	246.634	246.634
EU50	Pouring #1	EU50	Pouring #1	Core/Mold Baghouse	CU08	ST09	15 tons	Pb	4.79E-04	Industry Test	100	84.26%	7.19E-03	1.13E-03	1.92E-02	3.02E-03

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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
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Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU52	Mold Cooling	EU52	Mold Cooling	Core/Mold Baghouse	CU08	ST09	15 tons	Combined with EU50								
EU53	Shakeout Conveyor	EU53	Shakeout Conveyor	Sand Plant Baghouse	CU06	ST07	15 tons	PM	3.2	WebFIRE	100	99.77%	48.000	0.110	128.000	0.294
EU53	Shakeout Conveyor	EU53	Shakeout Conveyor	Sand Plant Baghouse	CU06	ST07	15 tons	PM_{10}	2.24	WebFIRE	100	98.75%	33.600	0.420	89.600	1.120
EU53	Shakeout Conveyor	EU53	Shakeout Conveyor	Sand Plant Baghouse	CU06	ST07	15 tons	$PM_{2.5}$	1.34	WebFIRE	100	98.62%	20.102	0.277	53.606	0.740
EU53	Shakeout Conveyor	EU53	Shakeout Conveyor	Sand Plant Baghouse	CU06	ST07	15 tons	VOC	0.616	Stack Test	100	0.00%	9.240	9.240	24.640	24.640
EU53	Shakeout Conveyor	EU53	Shakeout Conveyor	Sand Plant Baghouse	CU06	ST07	15 tons	CO	0.515	Stack Test	100	0.00%	7.725	7.725	20.600	20.600

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N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU57	Sand Plant Waste Sand Silo	EU57	Sand Plant Waste Sand Silo	Sand Plant Waste Sand Silo Bin Vent Filter	CU10	ST11	0.38 tons	PM	0.24	Ohio EPA RACM Guide	100	83.08%	0.091	0.015	0.399	0.067
EU57	Sand Plant Waste Sand Silo	EU57	Sand Plant Waste Sand Silo	Sand Plant Waste Sand Silo Bin Vent Filter	CU10	ST11	0.38 tons	PM_{10}	0.24	Ohio EPA RACM Guide	100	83.08%	0.091	0.015	0.399	0.067
EU57	Sand Plant Waste Sand Silo	EU57	Sand Plant Waste Sand Silo	Sand Plant Waste Sand Silo Bin Vent Filter	CU10	ST11	0.38 tons	$PM_{2.5}$	0.24	Ohio EPA RACM Guide	100	83.08%	0.091	0.015	0.399	0.067
EU59	Casting Cooling	EU59	Casting Cooling	Core/Mold Baghouse	CU08	ST09	15 tons	PM	0.032	1% of WebFIRE	100	84.26%	0.48	0.076	1.280	0.210
EU59	Casting Cooling	EU59	Casting Cooling	Core/Mold Baghouse	CU08	ST09	15 tons	PM_{10}	0.024	1% of WebFIRE	100	83.63%	0.336	0.055	0.896	0.147
EU59	Casting Cooling	EU59	Casting Cooling	Core/Mold Baghouse	CU08	ST09	15 tons	$PM_{2.5}$	0.013	1% of WebFIRE	100	80.91%	0.201	0.038	0.536	0.102
EU60	Sorting Conveyor	EU60	Sorting Conveyor	Fettling Baghouse	CU11	ST12	15 tons	PM	0.016	0.5% of WebFIRE	100	99.79%	0.240	0.001	0.640	0.001
EU60	Sorting Conveyor	EU60	Sorting Conveyor	Fettling Baghouse	CU11	ST12	15 tons	PM_{10}	0.011	0.5% of WebFIRE	100	98.23%	0.168	0.003	0.448	0.008
EU60	Sorting Conveyor	EU60	Sorting Conveyor	Fettling Baghouse	CU11	ST12	15 tons	$PM_{2.5}$	0.007	0.5% of WebFIRE	100	98.22%	0.101	0.002	0.268	0.005

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___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU61	Steel Shot Blasting #1	EU61	Steel Shot Blasting #1	Fettling Baghouse	CU11	ST12	15 tons	PM	15.5	Published Industry Paper (Gutow)	100	99.79%	232.500	0.448	620.000	1.302
EU61	Steel Shot Blasting #1	EU61	Steel Shot Blasting #1	Fettling Baghouse	CU11	ST12	15 tons	PM_{10}	1.7	WebFIRE	100	98.23%	25.500	0.451	68.000	1.204
EU61	Steel Shot Blasting #1	EU61	Steel Shot Blasting #1	Fettling Baghouse	CU11	ST12	15 tons	$PM_{2.5}$	1.7	WebFIRE	100	98.22%	25.500	0.454	68.000	1.210
EU63	Fettling Baghouse Waste Dust Silo	EU63	Fettling Baghouse Waste Dust Silo	Fettling Baghouse Wast Dust Silo Bin Vent Filter	CU12	ST13	0.14 tons	PM	0.24	Ohio EPA RACM Guide	100	83.08%	0.091	0.015	0.399	0.067
EU63	Fettling Baghouse Waste Dust Silo	EU63	Fettling Baghouse Waste Dust Silo	Fettling Baghouse Wast Dust Silo Bin Vent Filter	CU12	ST13	0.14 tons	PM_{10}	0.24	Ohio EPA RACM Guide	100	83.08%	0.091	0.015	0.399	0.067
EU63	Fettling Baghouse Waste Dust Silo	EU63	Fettling Baghouse Waste Dust Silo	Fettling Baghouse Wast Dust Silo Bin Vent Filter	CU12	ST13	0.14 tons	$PM_{2.5}$	0.24	Ohio EPA RACM Guide	100	83.08%	0.091	0.015	0.399	0.067

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													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU64	Auto Grinding #1	EU64	Auto Grinding #1	Fettling Baghouse	CU11	ST12	7.5 tons	PM	1.6	Published Industry Paper (Gutow)	100	99.79%	12	0.025	32	0.067
EU64	Auto Grinding #1	EU64	Auto Grinding #1	Fettling Baghouse	CU11	ST12	7.5 tons	PM_{10}	0.0045	WebFIRE	100	98.23%	0.034	0.001	0.09	0.002
EU64	Auto Grinding #1	EU64	Auto Grinding #1	Fettling Baghouse	CU11	ST12	7.5 tons	$PM_{2.5}$	0.0045	WebFIRE	100	98.22%	0.034	0.001	0.09	0.002
EU65	Auto Grinding #2	EU65	Auto Grinding #2	Fettling Baghouse	CU11	ST12	7.5 tons	PM	1.6	Published Industry Paper (Gutow)	100	99.79%	12	0.025	32	0.067
EU65	Auto Grinding #2	EU65	Auto Grinding #2	Fettling Baghouse	CU11	ST12	7.5 tons	PM_{10}	0.0045	WebFIRE	100	98.23%	0.034	0.001	0.09	0.002
EU65	Auto Grinding #2	EU65	Auto Grinding #2	Fettling Baghouse	CU11	ST12	7.5 tons	$PM_{2.5}$	0.0045	WebFIRE	100	98.22%	0.034	0.001	0.09	0.002

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Source Emissions Profile

__ Section N.1: Emission Summary
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___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU66	Machining Lines (9)	EU66	Machining Lines (9)	Cartridge Filters CU13a - 13h	CU13a-h CU17	ST16	15 tons	PM	1.6	Published Industry Paper (Gutow)	100	99.00%	24.000	0.240	64.000	0.640
EU66	Machining Lines (9)	EU66	Machining Lines (9)	Cartridge Filters CU13a - 13h	CU13a-h CU17	ST16	15 tons	PM_{10}	0.0045	WebFIRE	100	99.00%	0.068	0.001	0.180	0.002
EU66	Machining Lines (9)	EU66	Machining Lines (9)	Cartridge Filters CU13a - 13h	CU13a-h CU17	ST16	15 tons	$PM_{2.5}$	0.0045	WebFIRE	100	99.00%	0.068	0.001	0.180	0.002
EU67	Perforation Line #2	EU67	Perforation Line #2	Cartridge Filters CU13j	CI13j CU17	ST16	7.5 tons	PM	1.6	Published Industry Paper (Gutow)	100	99.00%	12.000	0.120	32.000	0.320
EU67	Perforation Line #2	EU67	Perforation Line #2	Cartridge Filters CU13j	CI13j CU17	ST16	7.5 tons	PM_{10}	0.0045	WebFIRE	100	99.00%	0.034	0.000	0.090	0.001
EU67	Perforation Line #2	EU67	Perforation Line #2	Cartridge Filters CU13j	CI13j CU17	ST16	7.5 tons	$PM_{2.5}$	0.0045	WebFIRE	100	99.00%	0.034	0.000	0.090	0.001

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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU68	Paint Line #3	EU68	Paint Line #3	Paint Line #3 Filter	CU14	ST15A	9.0 lbs	$PM/PM_{10}/PM_{2.5}$	0.87	Mass Balance	100	99.35%	2.349	0.015	9.396	0.061
EU68	Paint Line #3	EU68	Paint Line #3	Paint Line #3 Filter	CU14	ST15A	9.0 lbs	VOC	0.27	Stack Test	100	0.00%	2.430	2.430	9.720	9.720
EU68	Paint Line #3	EU68	Paint Line #3	Paint Line #3 Filter	CU14	ST15A	1.0 lbs	VOC	1	Mass Balance	100	0.00%	1.000	1.000	4.000	4.000
EU69	Paint Line #2	EU69	Paint Line #2	Paint Line #2 Filter	CU15	ST15B	9.0 lbs	$PM/PM_{10}/PM_{2.5}$	0.87	Mass Balance	100	99.00%	2.349	0.023	9.396	0.094
EU69	Paint Line #2	EU69	Paint Line #2	Paint Line #2 Filter	CU15	ST15B	9.0 lbs	VOC	0.27	Stack Test	100	0.00%	2.430	2.430	9.720	9.720
EU69	Paint Line #2	EU69	Paint Line #2	Paint Line #2 Filter	CU15	ST15B	1.0 lbs	VOC	1	Mass Balance	100	0.00%	1.000	1.000	4.000	4.000

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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU71	Paint Line #1	EU71	Paint Line #1	Paint Line #1 Filter	CU17	ST16	5.5 lbs	$PM/PM_{10}/PM_{2.5}$	0.41	Mass Balance	100	62.85%	0.677	0.251	1.23	0.457
EU71	Paint Line #1	EU71	Paint Line #1	Paint Line #1 Filter	CU17	ST16	5.5 lbs	VOC	0.18	Mass Balance	100	0.00%	0.992	0.992	1.804	1.804

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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU72	Emergency Generator #1	EU72	Emergency Generator #1	N/A	N/A	STG1	7.35 MMBtu	$PM/PM_{10}/PM_{2.5}$	0.07	AP-42	100	0.00%	0.512	0.026	0.512	0.026
EU72	Emergency Generator #1	EU72	Emergency Generator #1	N/A	N/A	STG1	7.35 MMBtu	SO_2	1.52	AP-42	100	0.00%	11.100	0.557	11.100	0.557
EU72	Emergency Generator #1	EU72	Emergency Generator #1	N/A	N/A	STG1	7.35 MMBtu	NO_2	3.2	AP-42	100	0.00%	23.500	1.180	23.500	1.180
EU72	Emergency Generator #1	EU72	Emergency Generator #1	N/A	N/A	STG1	7.35 MMBtu	VOC	0.09	AP-42	100	0.00%	0.620	0.033	0.620	0.033
EU72	Emergency Generator #1	EU72	Emergency Generator #1	N/A	N/A	STG1	7.35 MMBtu	CO	0.85	AP-42	100	0.00%	6.250	0.312	6.250	0.312
EU73	Emergency Generator #2	EU73	Emergency Generator #2	N/A	N/A	STG2	7.35 MMBtu	$PM/PM_{10}/PM_{2.5}$	0.07	AP-42	100	0.00%	0.512	0.026	0.512	0.026
EU73	Emergency Generator #2	EU73	Emergency Generator #2	N/A	N/A	STG2	7.35 MMBtu	SO_2	1.52	AP-42	100	0.00%	11.100	0.557	11.100	0.557
EU73	Emergency Generator #2	EU73	Emergency Generator #2	N/A	N/A	STG2	7.35 MMBtu	NO_2	3.2	AP-42	100	0.00%	23.500	1.180	23.500	1.180
EU73	Emergency Generator #2	EU73	Emergency Generator #2	N/A	N/A	STG2	7.35 MMBtu	VOC	0.09	AP-42	100	0.00%	0.620	0.033	0.620	0.033
EU73	Emergency Generator #2	EU73	Emergency Generator #2	N/A	N/A	STG2	7.35 MMBtu	CO	0.85	AP-42	100	0.00%	6.250	0.312	6.250	0.312

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___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU74	Emergency Generator #3	EU74	Emergency Generator #3	N/A	N/A	STG3	0.392 MMBtu	$PM/PM_{10}/PM_{2.5}$	0.31	AP-42	100	0.00%	0.122	0.122	0.006	0.006
EU74	Emergency Generator #3	EU74	Emergency Generator #3	N/A	N/A	STG3	0.392 MMBtu	SO_2	0.29	AP-42	100	0.00%	0.114	0.114	0.006	0.006
EU74	Emergency Generator #3	EU74	Emergency Generator #3	N/A	N/A	STG3	0.392 MMBtu	NO_2	4.41	AP-42	100	0.00%	1..729	1..729	0.086	0.086
EU74	Emergency Generator #3	EU74	Emergency Generator #3	N/A	N/A	STG3	0.392 MMBtu	VOC	0.35	AP-42	100	0.00%	0.137	0.137	0.007	0.007
EU74	Emergency Generator #3	EU74	Emergency Generator #3	N/A	N/A	STG3	0.392 MMBtu	CO	0.95	AP-42	100	0.00%	0.372	0.372	0.019	0.019

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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
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Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU75	Diesel Storage Tank	EU75	Diesel Storage Tank	N/A	N/A	STTK1	1000 gal	VOC	See Calcs	AP-42	100	0.00%	5.72	5.72	0.069	0.069
EU76	Paved Roads	EU76	Paved Roads	N/A	N/A	FUG										
EU77	Snag Grinder #1	EU77	Snag Grinder #1	Snag Grinder #1 Fabric Filter	CU21 CU11	ST12	7.5 tons	PM	1.6	Published Industry Paper (Gutow)	100	99.00%	12.000	0.120	32.000	0.320
EU77	Snag Grinder #1	EU77	Snag Grinder #1	Snag Grinder #1 Fabric Filter	CU21 CU11	ST12	7.5 tons	PM_{10}	0.0045	WebFIRE	100	99.00%	0.034	3.38E-04	0.090	0.001
EU77	Snag Grinder #1	EU77	Snag Grinder #1	Snag Grinder #1 Fabric Filter	CU21 CU11	ST12	7.5 tons	$PM_{2.5}$	0.0045	WebFIRE	100	99.00%	0.034	3.38E-04	0.090	0.001
EU78	Snag Grinder #2	EU78	Snag Grinder #2	Snag Grinder #2 Fabric Filter	CU22 CU11	ST12	7.5 tons	PM	1.6	Published Industry Paper (Gutow)	100	99.00%	12.000	0.120	32.000	0.320
EU78	Snag Grinder #2	EU78	Snag Grinder #2	Snag Grinder #2 Fabric Filter	CU22 CU11	ST12	7.5 tons	PM_{10}	0.0045	WebFIRE	100	99.00%	0.034	3.38E-04	0.090	0.001
EU78	Snag Grinder #2	EU78	Snag Grinder #2	Snag Grinder #2 Fabric Filter	CU22 CU11	ST12	7.5 tons	$PM_{2.5}$	0.0045	WebFIRE	100	99.00%	0.034	3.38E-04	0.090	0.001

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Additional Documentation

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Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU79	Core Wash Station #2	EU79	Core Wash Station #2	N/A	N/A	ST09	0.338 tons	VOC	0.10%	Mass Balance	100	0.00%	0.675	0.675	0.135	0.135
EU82	Rust Preventatitive Application	EU82	Rust Preventatitive Application	N/A	N/A	ST16	0.013 tons	VOC	10%	Mass Balance	100	0.00%	2.500	2.500	1.000	1.000

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Source Name: Fritz Winter North America, LP
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Date: Monday, April 12, 2021

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU83	Rotary Sprue Cleaner and Conveyors	EU83	Rotary Sprue Cleaner and Conveyors	Sand Plant BH Fettling BH	CU06 CU11	ST07 ST12	10 tons sand	PM	0.65	AIRS	100	99.79%	6.5	0.014	28.47	0.06
EU83	Rotary Sprue Cleaner and Conveyors	EU83	Rotary Sprue Cleaner and Conveyors	Sand Plant BH Fettling BH	CU06 CU11	ST07 ST12	10 tons sand	PM_{10}	0.54	WebFIRE	100	98.23%	5.4	0.096	23.652	0.419
EU83	Rotary Sprue Cleaner and Conveyors	EU83	Rotary Sprue Cleaner and Conveyors	Sand Plant BH Fettling BH	CU06 CU11	ST07 ST12	10 tons sand	$PM_{2.5}$	0.54	WebFIRE	100	98.22%	5.4	0.096	23.652	0.421
EU84	Perforation Line #1	EU84	Perforation Line #1	Cartridge Filters CU13i	CU13i CU17	ST16	7.5 tons	PM	1.6	Published Industry Paper (Gutow)	100	99.00%	12	0.12	32	0.32
EU84	Perforation Line #1	EU84	Perforation Line #1	Cartridge Filters CU13i	CU13i CU17	ST16	7.5 tons	PM10	0.0045	WebFIRE	100	99.00%	0.034	3.38E-04	0.09	0.001
EU84	Perforation Line #1	EU84	Perforation Line #1	Cartridge Filters CU13i	CU13i CU17	ST16	7.5 tons	PM2.5	0.0045	WebFIRE	100	99.00%	0.034	3.38E-04	0.09	0.001

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
ST02	Control Device ID: CU01 Emission Unit IDs: EU01, EU05 (sec), EU06(sec), EU07, EU08, EU09,EU10,EU13 (sec), EU15 (sec), EU18 (sec)	8.53	114.8	0	4072425	539906	176,538	104	51.5
ST03	Control Device ID: CU02 Emission Unit ID(s): EU17	1	72.2	0	4072413	539903	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter
ST04	Control Device ID: CU03 Emission Unit ID(s): EU19	1	72.2	0	4072404	539904	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter
ST05	Control Device ID: CU04 Emission Unit ID(s): EU20	1	72.2	0	4072407	539906	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter
ST06	Control Device ID: CU05 Emission Unit ID(s): EU21	1	72.2	0	4072411	539908	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter
ST07	Control Device ID: CU06 Emission Unit ID(s): EU22, EU53	6.6	131.2	0	4072396	539888	105,923	95	52.2
ST08	Control Device ID: CU07 Emission Unit ID(s): EU41 (blower), EU42 (blower)	2.8	85.3	0	4072517	539822	23,539	104	64.2
ST09	Control Device ID: CU08 Emission Unit ID(s): EU33, EU35A via CU19, EU35B via CU20, EU39 (mixer), EU40 (mixer),EU43 (sec), EU44, EU45, EU50, EU52, EU59, EU79 (sec), EU83	8.2	141.1	0	4072488	539816	176539	132	55.7
ST11	Control Device ID: CU10 Emission Unit ID(s): EU57	1	72.2	0	4072410	539901	N/A - Passive bin vent filter	68	N/A - Passive bin vent filter
ST12	Control Device ID: CU11 Emission Unit ID(s): EU60 (sec), EU61, EU64, EU65, EU77 (via passive filter), EU78 (via passive filter), EU83	5.25	98.4	0	4072331	539832	64731	68	49.9

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
ST13	Control Device ID: CU12 Emission Unit ID(s): EU63	6.5	141.1	0	4072488	539816	176573	132	55.7
ST15A	Control Device ID: CU14 Emission Unit ID(s): EU68	1.1	46.6	0	4072447	539710	2718	113	49.2
ST15B	Control Device ID: CU15 Emission Unit ID(s): EU69	1.1	46.6	0	4072435	539710	2718	113	49.2
ST16	Control Device ID: CU17 Emission Unit ID(s): EU66 via CU13a-h, EU67 via CU13j, EU83 via CU13i, EU71, EU82, EU84 via CU13i	1.1	46.6	0	4072424	539704	2718	113	49.2
STG1	Control Device ID: None Emission Unit ID(s): EU72	-	-	-	-	-	-	-	-
STG2	Control Device ID: None Emission Unit ID(s): EU73	-	-	-	-	-	-	-	-
STG3	Control Device ID: None Emission Unit ID(s): EU74	-	-	-	-	-	-	-	-
STTK-1	Control Device ID: None Emission Unit ID(s): EU75	-	-	-	-	-	-	-	-
FUG	Paved Roadways	-	-	-	-	-	-	-	-

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
All	All	All	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.	Only stack emissions are expected.

Section N.4: Notes, Comments, and Explanations
Various: Changed hourly and annual metal processing rate to 15 tph and 80,000 tpy, respectively
EU13 and EU14: Combine to a single EU ID EU13 and name "Molten Metal Transfer"
EU17: Change description from "Melt Shop Baghouse Waste Dust Silo" to "Core/Mold Baghouse Waste Dust Silo"
EU19: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU20: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU21: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity.
EU21 - EU30: Combine into a single emission unit described as "Moldmaking and Sand Handling" with Emission Unit ID EU21 to match SCC description

Section N.4: Notes, Comments, and Explanations
EU31 thru EU34: Combine into a single emission unit identied as "Moldmaking and Sand Preparation (EU21)"
EU33-EU34: Change maximum hourly capacity as 197 tph for the group; incorrect assumption to split 50:50
EU35A: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU35B: Change hourly capacity to 25 tph to reflect pnuematic conveying truck capacity
EU35A and EU35B: Bin Vents (CU18 and CU19) vent inside with secondary capture via CU08 through stack ST09
EU48 thru EU49: Combine into a single emission unit identied as "Moldmaking and Sand Preparation (EU21)"

Section N.4: Notes, Comments, and Explanations
EU61 and EU62: To match SCC, remove shot maximum hourly capacity and replace with metal hourly capacity for the group
EU64: Change name for Grinding #1 to Autogrinder #1, replace capacity with metal hourly capacity for the group
EU65: Change name for Grinding #2 to Autogrinder #2, replace capacity with metal hourly capacity for the group
EU66 and EU67: Combine and describe as "Machining " and identify as EU66
EU66-EU67: Cartridge Filters (CU13a-j) vent inside with secondary capture via Paint Line Fabric Filter stack ST16
EU68: Change name to Paint Line #3
EU69: Change name to Paint Line #2
EU71: Change name to Paint Line #1
EU77 - Change Paved Roadways from EU76 to EU77 as EU76 is already identified as the ID for the diesel storage tank.
See Table 2-1 thru 2-3 and emission calculations for other changes

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DEP7007DD

Insignificant Activities

___ Section DD.1: Table of Insignificant Activities
___ Section DD.2: Signature Block
___ Section DD.3: Notes, Comments, and Explanations

Source Name: **Fritz Winter North America, LP**

KY EIS (AFS) #: **21- 213-00064**

Permit #: **V-16-022 R1**

Agency Interest (AI) ID: **129745**

Date: **7/15/2025**

Section DD.1: Table of Insignificant Activities

*Identify each activity with a unique Insignificant Activity number (IA #); for example: 1, 2, 3… etc.

Insignificant Activity #	Description of Activity including Rated Capacity	Serial Number or Other Unique Identifier	Applicable Regulation(s)	Calculated Emissions
None				

Section DD.2: Signature Block

I, THE UNDERSIGNED, HEREBY CERTIFY UNDER PENALTY OF LAW, THAT I AM A RESPONSIBLE OFFICIAL, AND THAT I HAVE PERSONALLY EXAMINED, AND AM FAMILIAR WITH, THE INFORMATION SUBMITTED IN THIS DOCUMENT AND ALL ITS ATTACHMENTS. BASED ON MY INQUIRY OF THOSE INDIVIDUALS WITH PRIMARY RESPONSIBILITY FOR OBTAINING THE INFORMATION, I CERTIFY THAT THE INFORMATION IS ON KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE OR INCOMPLETE INFORMATION, INCLUDING THE POSSIBILITY OF FINE OR IMPRISONMENT.

	Authorized Signature	8-22-2025 **Date**
By:		
	Henning Knipper **Type/Print Name of Siguatory**	CEO **Title of Siguatory**

Section DD.3: Notes, Comments, and Explanations

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DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirements
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation
___ Complete DEP7007AI

Source Name: **Fritz Winter North America, LP**
KY EIS (AFS) #: **21-213-00064**
Permit #: **V-16-022 R1**
Agency Interest (AI) ID: **129745**
Date: **12/15/2021**

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
See Air	Permit Identified	Above					

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing

Section V.6: Notes, Comments, and Explanations

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DEP7007AA

Compliance Schedule for Noncomplying Emission Units

___ Section AA.1: Emission Unit Description
___ Section AA.2: Listing of Applicable Requirements
___ Section AA.3: Intermediate Checkpoints
___ Section AA.4: Notes, Comments, and Explanations

Additional Documentation

__ Attach a flow diagram

__ Complete DEP7007AI

Source Name: **Fritz Winter North America, LP**
KY EIS (AFS) #: **21- 213-00064**
Permit #: **V-16-022 R1**
Agency Interest (AI) ID: **129745**
Date: **12/31/2021**

Section AA.1: Emission Unit Description

Emission Unit #: Identified in Agreed Order
Emission Unit Name: Identified in Agreed Order
Construction Date: Identified elsewhere
Description:
(Attach flow diagram)
See Figures 2-1 through 2-7

Section AA.2: Listing of Applicable Requirements

List applicable requirements with which the emission unit does not comply.

	Applicable Requirement	Applicable Regulation	Effective Compliance Date
a)	See Agreed Order and Supporting Documents		
b)			
c)			
d)			
e)			

Detailed Description of Methods Used to Achieve Compliance	
a)	
b)	
c)	
d)	
e)	

Section AA.3: Intermediate Checkpoints

For a requirement with which the source is not in compliance, list remedial measures leading to compliance, including checkpoints and scheduled completion dates.

Checkpoint(s)	Scheduled Completion Date
Preliminary evaluation of process change completed.	Subsequent issued air permit will resolve any deficiency
Binding agreement entered into to alter emission unit.	See Agreed Order
Permit application submitted for construction of air pollution control equipment for this emission unit or equipment to replace this emission unit.	N/A
New equipment delivered to the source.	N/A
If present equipment was altered, date alteration began.	N/A
Construction of new equipment completed.	N/A
Alteration of existing equipment completed.	N/A
Emission unit tested to demonstrate compliance with the applicable requirements.	
Other (Describe): N/A	
Other (Describe):	
Other (Describe):	
Equipment fully operational and in full compliance.	

State the means used to demonstrate overall compliance.	Any requested compliance demonstration as a results of revised air permit issuance.

Section AA.4: Notes, Comments, and Explanations

Appendix V
Emission Estimation Supporting Information

1. Gutow
2. Ohio EPA RACM Foundry
3. Ohio EPA RACM Silos
4. CERP Test Report 1409-123-EQ
5. CERP Test Report 1256-1311-DQ
6. Email - ASK Focus I/II Pouring, Cooling and Shakeout Emission Factors
7. Table – Rust Preventative (Rustillo 4175) Evaporation Study
8. Baghouse Dust Metals Analysis Results
9. ASK Chemicals PUCB Weight Loss Study

An Inventory of Iron Foundry Emissions*

by Bernard S. Gutow, Associate,
A. T. Kearney & Co., Inc., Chicago, IL.

This article is the second of highly valuable studies undertaken by the A. T. Kearney Co. that we have been privileged to bring to MODERN CASTING readers (First article appeared in March '71 issue). Mr. Gutow's work serves to place metalcasting's contribution to the air pollution problem in its correct perspective. It should be required reading for every air pollution control board.

WIDESPREAD distribution of iron foundries and the high visibility of the cupola stack in most communities in which an iron foundry is located, have combined to label the industry as a major source of air pollution. This opinion is often strongly shared by downwind neighbors of a foundry using an uncontrolled cupola for iron melting, and air pollution control agencies receiving complaints of foundry emissions.

Iron foundries are located in almost every state. However, the highest concentration is in the Great Lakes states of Pennsylvania, Ohio, Michigan, Illinois, Wisconsin, New York and Indiana. Almost half of all iron foundries in the United States and more than half of the iron castings capacity are found in Great Lakes States.

California contains the greatest concentration of iron foundries in the western half of the country. One-third of iron foundries in that 17-state area are in California. Other areas of high iron foundry concentration are the southeastern states and the northern states bordering on the west bank of the Mississippi River.

Principal concentrations of iron foundries lie in major metropolitan areas. Fifty such areas account for more than two-thirds of the iron foundries. Here again, principal concentration is in the industrial cities in the seven Great Lakes states, with two-thirds of these centers being in, or bordering on, those states.

Pollutants discharged by the iron foundry can be classified as:

1. Emissions from melting furnace operations.
2. Emissions from other dust producing operations within the plant.
3. Odors and gaseous compounds from both sources.

Two questions arise immediately:

1. How much of these pollutants are discharged into the atmosphere, uncollected, by iron foundries in the United States?
2. In which states or regions are concentrations the greatest?

The answers were arrived at by A. T. Kearney & Company, Inc. during the work it performed for the Air Pollution Control Office of the Environmental Protection Agency in a study titled "Systems Analysis of Emissions and Emissions Control in the Iron Foundry Industry."

The most recent nationwide estimates of emissions from all sources were prepared by the Public Health Service in 1968 and are presented in Table I. The data are presented as estimates of five primary air pollutants: carbon monoxide, particulates, sulfur oxides, hydrocarbons and nitrogen oxides. The nationwide estimate for each air pollutant is presented for several source categories.

In 1968, all industrial processes, including iron foundries, accounted for an estimated 7.5 million tons or 26.5% of total particulate emissions and 9.7 million tons or 9.7% of total carbon monoxide emissions. Carbon monoxide and particulates are the primary air pollutants in the iron foundry industry.

The A. T. Kearney Report, a work which many foundrymen will want added to their store of valuable operating information, can be purchased. The reports can be obtained from the National Technical Information Service, Springfield, VA., 22151.

The reports are numbered and priced as follows: Volume I is PB 198348 $6.00; Volume II is PB 198349 $3.00; Volume III is PB 198350 $6.00. These are typed reports. They are also available as microfiche for metalcasters equipped with reader-duplicating equipment.

Inventory of Iron Foundry Emissions

Estimates of iron foundry emissions in 1969 were made during the Kearney study for both melting and non-melting operations. The basis used for determining amounts of particulate and gaseous emissions was molten iron production. Data were obtained from the Department of Commerce giving total 1969 gray iron casting tonnage for each of nine geographical regions.

A calculation of the percent of casting tonnage produced from iron melted in cupolas, electric arc and other furnaces was made for for each geographical region. Only production from cupolas and electric arc furnaces was considered in determining emissions from melting operations. Total production was used for estimating emissions from non-melting operations.

Emissions from other melting equipment, including induction furnaces and reverberatory furnaces are negligible. Not only because generally cleaner scrap metal is used for furnace charges. Also, a relatively small percentage of the total iron is melted in these furnaces.

Preheating of dirtier scrap for charging into induction furnaces will add significantly to the emissions inventory only when the process is substantially more widely used. At its present level of application, preheater emissions are also

*Prepared for the Air Pollution Control Office, Environmental Protection Agency, under contract No. CPA 22-69-106.

negligible.

The sum of both cupola and electric arc furnace production figures provided casting production totals for each region for the emissions generating melters. Assuming an average iron yield of 65%, from molten metal to castings, the total tonnage of molten iron produced was calculated for cupolas and electric arc furnaces.

An analysis of cupola and electric furnace emissions and factors affecting the rates of emissions, made during the Kearney study cited earlier, shows that an average of 20.8 lb of particulate emissions are produced per ton of metal melted in an iron foundry cupola.

An average of 13.8 lb of particulate emissions per ton of metal results from direct electric arc furnace iron production. These air pollutant emission factors were applied to the molten iron production to determine the particulate emissions generated in melting operations.

In using the estimated molten iron tonnage to develop emission levels for non-melting operations, considerable care was exercised to avoid artificially inflating the emissions total by including emissions from non-emissions producing operations. For example, the production tonnage of centrifugally cast pipe accounts for over 10% of all iron castings tonnage.

This was carefully excluded from the appropriate regional production totals when particulate emission values were determined for operations such as molding and shakeout, since most iron pipe is cast in metal molds. Also, centrifugally cast pipe production was allocated more towards cupola melting than electric arc melting in accordance with what is usually the case in pipe foundries.

Based on a survey of iron foundries, considering the number and capacity of furnaces equipped with control systems, the effectiveness of the control systems, and the number of uncontrolled furnaces, it was estimated that on the average, 75% of the particulate emissions generated are presently being released to the atmosphere. Estimated particulate emissions not captured and collected, but emitted to the atmosphere accounted for a nationwide total of 182,000 tons in 1969.

TABLE 1. Estimated Nationwide Emission, 1968. (106 Tons/Year).

Source	CO	Particulates	SO_x	HC	NO_x
Transportation	63.8	1.2	0.8	16.6	8.1
Fuel combustion in stationary sources	1.9	8.9	24.4	0.7	10.0
Industrial processes	9.7	7.5	7.3	4.6	0.2
Solid waste disposal	7.8	1.1	0.1	1.6	0.6
Miscellaneous	16.9	9.6	0.6	8.5	1.7
Total	100.1	28.3	33.2	32.0	20.6

Source: National Air Pollution Control Administration, Publication No. AP-73, August, 1970.

The estimates of tons of carbon monoxide generated in cupolas are based upon an average cupola operating with a seven to one metal to coke ratio and using coke with an average carbon content of 91%. It is also assumed that the carbon dioxide content of the top gas is at equilibrium. Under these conditions, 276 lb of carbon monoxide are generated per ton of metal melted.

The amount of carbon monoxide emitted to the atmosphere depends on a number of factors, including temperature of top gas, availability of infiltrated air to provide oxygen for combustion, completeness of combustion and percent of total time burning of carbon monoxide occurs.

Theoretically, with sufficient oxygen from the infiltrated air and with constant combustion, carbon monoxide content should be completely burned. However, several factors tend to work against this ideal condition.

These include: the flame being extinguished by each charge addition, lack of immediate reignition either with or without an afterburner, or with an improperly directed flame from an afterburner, varying carbon monoxide content precluding constant combustion and a variable air supply. A conservative estimate of 50% combustion efficiency has been applied to the quantities of total carbon monoxide generated to obtain the estimated weight of this gas emitted into the atmosphere. The estimated total 1969 tonnage of carbon monoxide emitted by iron foundries was 1,462,000 tons nationwide.

The results of these calculations for emissions from melting operation for 1969 nationwide produc-

TABLE 2. Particulate Emission Factors From Non-Melting Operations.

Department	Operation	(1) Emissions Generated Lb/Ton Melt	(2) Normal Collection Percent	(3) Emissions to Foundry Environment Lb/Ton Melt	(4) Settling Factor Percent	(5) Emissions Released to Atmosphere Lb/Ton Melt	(6) Emissions to Atmosphere Nationwide* Lb/Ton Melt
Scrap Yard	Raw Material Handling	.20 .20	0	.20	80	.04	.04
	Charge Make-up	.15 .15	0	.15	80	.03	.03
	Charge Pre-heating	.20 .20	90 40	.18	80	.11	.01
Molding, Pouring and Shakeout	Molding	.50 .50	0 0	.50	90 90	.05 .05	.01
	Magnesium Treatment	5.00 5.00	90 90	1.50 4.50	75 75	1.12 1.12	.11
	Pouring	5.10 5.10	90 90	4.59 4.59	60 60	1.83 1.83	.14
	Cooling	10.30 10.30	90 90	9.27 9.27	90 90	.93 .93	.75
	Shakeout	32.20 32.20	60 60	12.80 12.80	90 90	1.28 1.28	1.02
Cleaning and Finishing	Shot Blast	15.50 15.50	99	.16	90	.03	.02
	Grinding	1.60 1.60	95 95	.08	90	.02	.01
	Annealing	.10 .10	0 0	.10	90	.02	.01
	Painting	.02 .02	95 95	—	40	.07	.03
Sand Conditioning	Dry Sand Handling	10.30 10.3	90 90	9.27	90 90	0.93 0.93	.75
	Prepared Sand Handling	.50 .50	0 0	.50	90 90	0.05 0.05	.04
	Screening	10.00 10.00	0 0	9.00	90 90	0.9 0.9	.84
	Milling	20.60 20.60	0 0	8.24	90 90	0.82 0.82	.65
	Drying and Sand Reclamation	1.50 1.50	60	60	80 80	0.12 0.12	.01
Core Department	Oil Sand Core Baking	10 .10	50	05	0	.05	.03
	Shell Hot Box and Cold Set Sand Cores	1.02 1.02	0	1.02	0	1.02	.79
Pattern Shop	Wood Patternmaking	.01 .01	0	—	50	—	—
	Metal Patternmaking	.02 .02	80	—	50	—	—
Total		114.92		60.21		5.31	5.83

*Note: *Incidence factor has been applied to these emissions rates to reflect actual industry application of each operation.*

tion levels are summarized below.

Reported 1969 castings production .... 17,153,000 Tons
Total castings produced cupola and electric arc ..... 16,614,000 Tons
Total molten iron produced cupola and electric arc ... 24,367,000 Tons
Total particulate emissions generated ..... 243,000 Tons
Total carbon monoxide generated ..... 2,924,000 Tons
Total particulate emissions emitted ..... 182,000 Tons
Total carbon monoxide emitted ..... 1,462,000 Tons

The impact of particulate emissions discharged to the atmosphere from foundry melting operations on the 1968 inventory by NAPCA, Figure 1, is that iron foundry particulate matter represents about 0.64% of particulates from all sources and 2.4% of particulates from industrial sources. Carbon monoxide emissions emitted from iron foundries represent about 1.46% of carbon monoxide from all sources and about 15.1% of carbon monoxide from industrial sources.

Particles small enough to remain suspended in air over an extended period are defined as aerosols. The diameter of such particles has been identified as from 0.01 to 100 microns. Particles under 50 microns in diameter tend to remain airborne indefinitely. These are readily transported by the wind, while larger particles generally settle out of the atmosphere.

Using 50 microns as a limiting diameter, aerosols resulting from iron melting operations amount to approximately 56% by weight of total emissions generated. On this basis, the suspendible particulate matter generated by melting operations in 1969 amounted to 136,000 tons, of which approximately 102,000 tons were emitted to the atmosphere.

Particulates over 50 microns in diameter emitted to the atmosphere, being too large to remain suspended, settled out in a short time, depending on meteorological conditions. These totaled 80,000 tons in 1969.

Emissions from non-melting foundry processes, with a single important exception are often controlled as standard practice. These generally and principally affect the internal foundry environment. They are released to the atmosphere only in relatively minor quantities compared to melting furnace emissions.

Concentration of these emissions at their source can be substantial as in shakeout, abrasive cleaning and grinding operations. But, the particles emitted are generally large with a relatively high settling rate. The portion of the particulate matter escaping normal ductwork collection largely tends to settle out within the foundry building.

An analysis of non-melting operations indicates that about 115 pounds of emissions are estimated to be generated for each ton of metal melted. On the average, only 5.83 pounds or 5% of this total is estimated to be released to the atmosphere. Normal collection practices and settling out within the foundry building account for the difference between these two quantities.

Table 2 illustrates the development of particulate emissions factors for non-melting operations. The various non-melting departments which produce particulate emissions are listed with the different operations occurring in each department. The emissions generated in pounds per ton of melt are estimated for each operation and tabulated in Column 1. Values range from 0.01 lb/ton for wood patternmaking to 32.20 lb/ton for shakeout, and total 114.92 lb/ton generated from all sources.

An estimate of the percent collected monthly is tabulated in Column 2 of the Table. This was applied to the emissions generated to estimate the amount of emission from each operation released to the foundry invironment. It is tabulated in Column 3, and totals 60.21 lb/ton. Of the amount released to the foundry environment, a large percentage settles out relatively soon. Settling factors, shown in Column 4, were estimated and applied to emissions released to the foundry environment. These were used to determine the emissions released to the atmosphere as given in Column 5 and totals 9.31 lb/ton from all operations.

All iron foundries do not have all of the departments and operations. To account for this and adjust emission factors accordingly, an incidence factor was applied to the emissions released to the atmosphere for each operation. This was used to obtain the average emissions released to the atmosphere, nationwide. It is tabulated in Column 6 and totals 5.83 lb/ton.

TABLE 3. Results of Nationwide Emissions Estimated From Iron Foundries

CO emitted from iron foundries	1,462,000 Tons Per Year
Percent of all sources	1.46%
Percent of industrial processes	15.1 %
Particulate emissions emitted to atmosphere	
From melting operations	182,000 Tons Per Year
From non-melting operations	76,600
Total	258,600 Tons Per Year
Percent of all sources	.91%
Percent of all industrial processes	3.46%

Summary of Results

The high concentration of iron foundries in the Great Lakes states, discussed earlier, accounted for almost 70% of the national molten iron production and approximately 72% of the particulate emissions emitted from the melting and non-melting operations. If the East South Central states of Kentucky, Mississippi, Alabama and Tennessee are also included, almost 85% of the total iron foundry particulate emissions are accounted for.

About 73% of the carbon monoxide emitted from iron foundries occurs in the Great Lakes states. An additional 10% of carbon monoxide emissions occur in the East South Central states for a combined total of almost 83%.

The results of the total nationwide emissions estimated to come from iron foundries are summarized in Table 3.

Although iron foundries annually emit a significant tonnage of carbon monoxide and particulate matter, their percent of the total is relatively small.

An Inventory of Iron Foundry Emissions
by Bernard S. Gutow

Particulate Emission Factors form Non-Melting Operations

Department	Operation	(1) Emissions Generated, lb/ton Melt	(2) Normal Collection, Percent	(3) Emissions to Foundry Environment, lb/ton Melt	(4) Settling Factor, Percent	(5) Emissions Released to Atmosphere, lb/ton Melt	(6) Emissions to Atmosphere Nationwide, lb/ton Melt
Scrap Yard	Raw Material Handling	0.2	0%	0.20	80%	0.04	0.04
	Charge Make-up	0.15	0%	0.15	80%	0.03	0.03
	Charge Pre-heating	0.2	10%	0.18	40%	0.11	0.01
Molding, Pouring and Shakeout	Molding	0.5	0%	0.50	90%	0.05	0.04
	Magnesium Treatment	5	10%	4.50	75%	1.13	0.11
	Pouring	5.1	10%	4.59	60%	1.84	1.45
	Cooling	10.3	10%	9.27	90%	0.93	0.75
	Shakeout	32.2	60%	12.88	90%	1.29	1.02
Cleaning and Finishing	Shot Blast	15.5	99%	0.16	80%	0.03	0.02
	Grinding	1.6	95%	0.08	80%	0.02	0.01
	Annealing	0.1	0%	0.10	30%	0.07	0.03
	Painting	0.02	95%	0.00	40%	0.00	0.00
Sand Conditioning	Dry Sand Handling	10.3	10%	9.27	90%	0.93	0.75
	Prepared Sand Handling	0.5	0%	0.50	90%	0.05	0.04
	Screening	10	20%	8.00	90%	0.80	0.64
	Mulling	20.6	60%	8.24	90%	0.82	0.65
	Drying and Sand Reclamation	1.5 (22.3 + 20.6)	60%	0.60	80%	0.12	0.01
Core Department	Oil Sand Core Baking	0.1	50%	0.05	0%	0.05	0.03
	Shell, Hot Box and Cold Set Sand Cores	1.02	0%	1.02	0%	1.02	0.20
Pattern Shop	Wood Patternmaking	0.01	10%	0.01	50%	0.00	0.00
	Metal Patternmaking	0.02	80%	0.00	50%	0.00	0.00
Total		**114.92**		**60.30**		**9.32**	**5.83**

PREFACE

Rule 3745-17-08 of the Ohio Administrative Code gives examples of reasonably available control measures (RACM) which should be employed for various types of fugitive dust sources. The rule covers a large number of diverse types of sources and, of necessity, is written in general terms.

The burden of developing an acceptable control program, which will meet the requirements of this rule and result in the use of reasonably available control technology (RACT) for one or more fugitive dust sources, lies with the owner/operator of the source(s). The type of control measures which are presently used by industry throughout the nation and which would constitute RACT for specific sources can, in general, be easily discerned by researching available environmental control publications and literature.

The Office of Air Pollution Control (OAPC) realizes that Ohio industry will need assistance in developing acceptable control programs and that the Agency's field office personnel will need assistance or guidance in reviewing those programs. This document has been prepared to specifically address those needs.

The OAPC would like to emphasize that the definitions of RACT in this document for the various types of fugitive dust sources are not "cast in concrete". Deviations from the general definitions or recommendations will be permitted based upon source-specific considerations; however, as stated earlier, the burden will be upon the owner/operator of an affected facility to demonstrate that the proposed, overall control program constitutes RACT and meets the requirements of rule 3745-17-08.

TABLE 2.7-1. FUGITIVE DUST EMISSION FACTORS FOR IRON FOUNDRIES

	Source	Emission factor	Reliability Rating	Reference
1	Cupola furnace charging and tapping	0.1 to 2.0 lb/ton iron produced	E	1
2	Electric arc furnace charging and tapping	0.7 lb/ton iron charged[a] 1.4 lbs/ton iron charged[b]	E	19
3	Electric induction furnace melting, charging and tapping	1.5 lb/ton iron produced	E	1
4	Reverberatory furnace charging and tapping	0.1 lb/ton iron produced	E	3
5	Ductile iron inoculation	3.3 to 4.5 lb/ton iron produced	D	4,5
6	Pouring molten metal into molds	0.1 to 4.13 lb/ton iron produced	D	4,6
7	Casting shakeout	1.2 to 12.8 lb/ton iron produced	E	4,7
8	Cooling and cleaning castings	0.16 to 0.8 lb/ton castings produced	D	4,7
9	Finishing castings	0.01 lb/ton castings produced	E	7
10	Core and mold sand unloading and storage: mechanical handling pneumatic handling	 0.03 lb/ton sand unloaded[c] NA	 E	 20
11	Core sand and binder mixing	0.3 lb/ton sand mixed or 0.75 to 8.24 lb/ton iron produced	E E	2 4,7
12	Core making	0.35 lb/ton cores produced	E	2
13	Core baking	0.03 to 5.4 lb/ton cores baked	E	7,9,20
14	Mold sand preparation	1.3 lb/ton castings produced	E	4
15	Mold making	0.04 lb/ton castings produced	E	7

NA = Not available
[a]With no alloying in the ladle.
[b]With alloying in the ladle.
[c]Sand unloading emission factor is assumed to be equivalent to the taconite pellets unloading emission factor as presented in Section 2.1.3. Fugitive dust emissions from storage are estimated to be negligible since sand is normally stored indoors.

TABLE 2.22-1. FUGITIVE DUST EMISSION FACTORS FOR CONCRETE BATCHING PLANTS

	Source	Emission factor	Reliability rating	Reference
(1)	Sand and aggregate storage			
	loading onto piles	0.04 lb/ton loaded	D	2
	vehicular traffic	0.04 lb/ton stored	D	2
	wind erosion	0.11 lb/ton stored	D	2
	loadout from piles	0.05 lb/ton loaded	D	2
(2)	Transfer of sand and aggregate to elevated bins	0.04 lb/ton handled	E	2
(3)	Cement unloading to elevated storage silos	0.24 lb/ton unloaded	E	2
(4)	Silo vents	0.24 lb/ton unloaded	E	2
(5)	Weigh hopper loading of cement, sand and aggregate	0.02 lb/ton loaded	E	2
(6)	Mixer loading of cement, sand and aggregate (central-mix plant)	0.04 lb/ton loaded	E	2
(7)	Loading of transit-mix truck (batching plant)	0.02 lb/ton	E	2
(8)	Loading of flat-bed truck (dry-batching plant)	0.04 lb/ton	E	2

Casting Emission Reduction Program

Prepared by:

TECHNIKON LLC

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www.technikonllc.com

US Army Contract DAAE30-02-C-1095
FY2002 Tasks

Core Room Baseline

Technikon # 1409-123-EQ

Originally Published
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EPA United States Environmental Protection Agency

CISA

AFS AMERICAN FOUNDRY SOCIETY, INC.

UNITED STATES COUNCIL FOR AUTOMOTIVE RESEARCH

USCAR

DAIMLERCHRYSLER Ford Motor Company General Motors

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Baseline: Core Room Emissions
Sand Mixing Core Making, Core Storage

1409-123 Test EQ

This report has been reviewed for completeness and accuracy and approved for release by the following:

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The data contained in this report were developed to provide baseline data for assessing the relative emissions profile of product or process as submitted for evaluation. You may not obtain the same results in your facility. Data was not collected to assess casting quality, cost, or producability.

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Executive Summary

This report contains the results of VOC emission testing during phenolic urethane Cold Box core making. All testing was conducted in the Technikon, LLC Production foundry core making facility.

The test was divided into three segments, core mixing, core blowing, and core storage. Core mixing was performed using a Redford/Carver 50 pound core sand mixer. During the core-blowing portion of the test, the gassing and purge emissions and the "fugitive" emissions were measured together. The storage emissions represent the VOCs released to the environment from the time of core removal from the core box until the core is used to produce a casting. For this study, a five (5) hour storage time was established. All components of mold making were conducted within enclosures meeting the criteria for a temporary total enclosure (TTE) as specified in US EPA Method 204.

Each test segment consisted of nine (9) replicate runs. Samples were collected on sorbent tubes during each run for selected VOCs and HAPs for subsequent laboratory analysis in accordance with US-EPA Method 18. All sampling locations were consistent with US EPA Method 1 except for core storage. The storage segment of the test used a laminar flow-through enclosure to sweep all of the emissions to the Method 18 sampling manifold. US EPA Method 25A, Total Gaseous Organic Concentration (TGOC), was used to monitor all segments of the test.

The table below summarizes the results for each of the test segments in lbs/lb of binder.

Analyte	Mixing	Gas/Purge Fugitives	Storage	Total
TGOC as Propane	0.0041	NA	NA	NA
HC as Hexane	0.0021	0.0752	0.0171	0.0944
Sum of VOCs	0.0001	0.0014	0.0008	0.0023
Sum of HAPs	0.0001	0.0014	0.0008	0.0023
Sum of POMs	ND	0.0010	0.0007	0.0017

NA: Not Applicable. **TGOC**: measures all carbon-containing organic compounds. The predominant organic in these test-segments was the triethylamine catalyst which was not a target analyte.

It must be noted that the reference testing performed is not suitable for use as emission factors or for purposes other than evaluating the relative emission reductions associated with the use of alternative materials, equipment, or processes. The emissions measurements are unique to the specific castings produced, materials used, and testing methodology associated with these tests, and should not be used as the basis for estimating emissions from actual commercial foundry applications.

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1.0 Introduction

1.1 Background

Technikon LLC is a privately held contract research organization located in McClellan, California, a suburb of Sacramento. Technikon offers emissions research services to industrial and government clients specializing in the metal casting and mobile emissions areas. Technikon operates the Casting Emission Reduction Program (CERP). CERP is a cooperative initiative between the Department of Defense (US Army) and the United States Council for Automotive Research (USCAR). Its purpose is to evaluate alternative casting materials and processes that are designed to reduce air emissions and/or produce more efficient casting processes. Other technical partners directly supporting the project include: the American Foundry Society (AFS); the Casting Industry Suppliers Association (CISA); the US Environmental Protection Agency (USEPA); and the California Air Resources Board (CARB).

1.2 Technikon Objectives

The primary objective of Technikon is to evaluate materials, equipment, and processes used in the production of metal castings. Technikon's facility was designed to evaluate alternate materials and production processes designed to achieve significant air emission reductions, especially for the 1990 Clean Air Act Amendment. The facility has two principal testing arenas: a Pre-Production Foundry designed to measure airborne emissions from individually poured molds, and a Production Foundry designed to measure air emissions in a continuous full scale production process. Each of these testing arenas has been specially designed to facilitate the collection and evaluation of airborne emissions and associated process data.

The Production Foundry provides simultaneous detailed individual emission measurements using methods based on USEPA protocols for the melting, pouring, sand preparation, mold making, and core making processes. The core making area of the Production foundry contains three core blowers, a Georg Fischer for the preparation of automotive block cores, a Redford that is used for the production of step cores, and a second smaller Redford to produce dogbone tensile test specimens.

It must be noted that the results from the reference and product testing performed are not suitable for use as emission factors or for other purposes other than evaluating the relative emission reductions associated with the use of alternative materials, equipment, or manufacturing processes. The emissions measurements are unique to the specific castings produced, materials used, and testing methodology associated with these tests. These measurements should not be used as the basis for estimating emissions from actual commercial foundry applications.

1.3 Report Organization

This report has been designed to document the methodology and results of a specific test plan that was used to evaluate VOC emissions from the ISOCURE® core making process. Section 2 of this report includes a summary of the methodologies used for data collection and analysis,

emission calculations, QA/QC procedures, and data management and reduction methods. Specific data collected during this test are summarized in Section 3 of this report, with detailed data included in Appendix B of this report. Section 4 of this report contains a discussion of the results, and Section 5 contains recommendations for further testing.

The raw data for this test series are included in a folder that is maintained at the Technikon facility.

1.4 Specific Test Plan and Objectives

This report contains the results of testing performed to provide data on selected VOC emissions from the core making process. Table 1-1 provides a summary of the test plan for the mixing, core making, and storage phase. The details of the approved test plan are included in Appendix A.

Table 1-1 Test Plan Summary

	Test Plan
Type of Process tested	Core Making Emissions Study
Test Plan Number	1409-123
Binder System	Ashland ISOCURE® 305/904
Number of tests	9 each at core blowing, core mixing, and core storage
Test Date	8/19/02 > 9/13/02
Emissions Measured	TGOC as Propane, HC as Hexane, o-Cresol, Phenol, Formaldehyde, Naphthalene, 1-Me Naphthalene, 2-Me Naphthalene
Process Parameters Measured	Sand, and Binder Weights, Incoming Sand Temperature, Sand Mixing Time, Core Machine Cycle Time
Source Parameters Measured	Exhaust Duct Temperature, Pressure, and Volumetric Flow Rate

2.0 Test Methodology

2.1 Description of Process and Testing Equipment

Figure 2-1 is a diagram of the core making process and testing equipment.

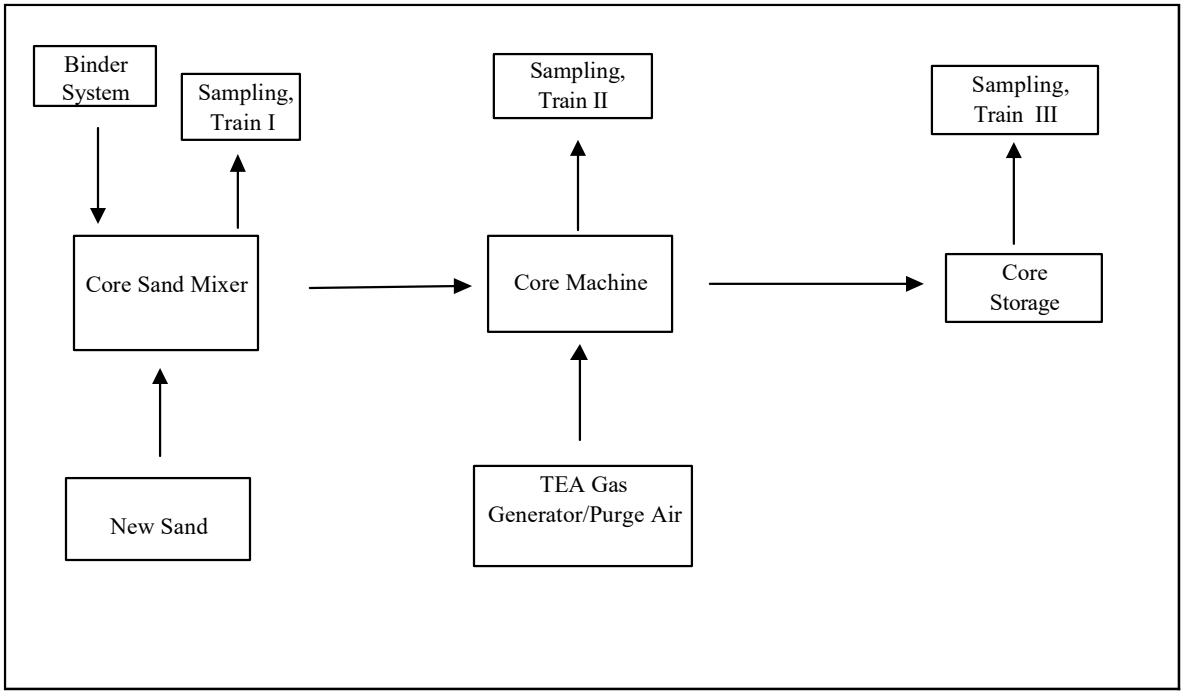


Figure 2-1 Core Making and Testing Process

2.2 Description of Testing Program

The specific steps used in this sampling program are summarized below:

1. **Test Plan Review and Approval:** The proposed test plan was reviewed by the Technikon staff and the CERP Steering Committee, and approved.

2. **Core Preparation**: Step cores were prepared for this test in the Production foundry core room area. The sand and binder were mixed in a Paddle Wheeled Sand Mixer, and then introduced (blown) into the core tooling of the Redford-Carver core machine. The core-making machine was contained in a permanent total enclosures meeting US EPA Method 204 criteria. A weighed amount of the catalyst triethylamine (TEA) gas was heated to 84°F and allowed to expand into the sand in the core box to cure the core. Finally, purge air, heated to 80°F, was blown through the sand mixture in the core box. All these gases

are exhausted to a wet gas scrubber charged with sulfuric acid at pH 4 or less. Step cores are fabricated in a single cavity core box. One blow produces a single step core.

3. **Individual Sampling Events:** Sampling to determine the core making emissions consisted of three (3) segments. The mixing emissions were collected from a Paddle Wheeled 50 pound core sand mixer for seven (7) minutes. The mixed sand was dumped into the Redford Carver sand storage hopper. Air samples were collected during the seven (7) minute mix cycle prior to dumping. During the production of step cores, air sample were also collected to determine the amount of solvents being vented off the core process. The samples were collected during each of the nine (9) thirty (30) minute runs that comprised this portion of the test. The storage segment of the test consisted of placing four (4) cores in the flow-through storage enclosures as soon as they were removed from the core machine. The storage enclosures were sealed and sampling begun. A five (5) hour integrated sample was collected. All of the enclosures used during this test meet or exceed US-EPA Method 204 criteria for Temporary Total Enclosures.

Sand Mixing

Core Making

Core Storage

4. **Process Parameter Measurements:** Table 2-1 lists the process parameters that are monitored during each test. The analytical equipment and methods used are also listed.

Table 2-1 Process Parameters Measured

Parameter	Analytical Equipment and Methods
Binder Weight	Mettler PJ8000 Digital Scale (Gravimetric)
Core Sand Weight	Simpson IQ-800-3A Digital Scale

5. **Air Emissions Analysis:** The specific sampling and analytical methods used in the core sand mixing, making, and core storage tests are based on the USEPA reference methods shown in Table 2-2. The details of the specific testing procedures and their variance from the reference methods, if any, are included in the Technikon Standard Operating Procedures.

Table 2-2 Sampling and Analytical Methods

Measurement Parameter	Test Method*
Port location	EPA Method 1
Number of traverse points	EPA Method 1
Gas velocity and temperature	EPA Method 2
HC as Hexane Benzene, Naphthalene, Formaldehyde, o-Cresol, Phenol,	EPA Method 18, NIOSH 1500, NIOSH 2002, TO-11
TGOC (THC) as Propane concentration	EPA Method 25A
Volatile Matter content	EPA Method 24

* These methods were specifically modified to meet the testing objectives of the CERP Program.

6. **Data Reduction, Tabulation and Preliminary Report Preparation:** The analytical results of the emissions tests provide the mass of each analyte in the sample. For the core-blowing segment of the test, the total mass of the analyte emitted is calculated by multiplying the mass of analyte in the sample times the ratio of the sample volume to the total stack gas volume during the test. The total stack gas volume is calculated from the measured stack gas velocity and duct diameter. The total mass of analyte is then divided by the weight of the binder used to provide emissions data in pounds of analyte per pound of binder.

In the case of the storage segment of this test, the stack parameters are replaced by the total volume of gas flowing through the storage enclosure during each sampling period. The total flow rate through the enclosure was controlled with critical orifices. The total mass of the analyte emitted is then calculated by multiplying the measured mass of analyte in the sample times the ratio of sample volume to total gas volume over the same time period.

7. **Report Preparation and Review:** The Preliminary Draft Report is reviewed by the Process Team and Emissions Team to ensure its completeness, consistency with the test plan, and adherence to the prescribed QA/QC procedures. Appropriate observations, conclusions and recommendations are added to the report to produce a Draft Report. The Draft Report is reviewed by the Vice President-Measurement Technologies, the Vice President-Operations. Comments are incorporated into a Final Report prior to final signature approval and distribution.

2.3 Quality Assurance and Quality Control (QA/QC) Procedures

Detailed QA/QC and data validation procedures for the process parameters, stack measurements, and laboratory analytical procedures are included in the Technikon Standard Operating Procedures. In order to ensure the timely review of critical quality control parameters, the following procedures are followed:

~ Immediately following the individual sampling events performed for each test, specific process parameters are reviewed by the Manager - Process Engineering to ensure that the parameters are maintained within the prescribed control ranges. Where data are not within the prescribed ranges, the Manager - Process Engineering and the Vice President-Operations determine whether the individual test samples should be invalidated or flagged for further analysis following review of the laboratory data.

~ The source (stack) and sampling parameters, analytical results and corresponding laboratory QA/QC data are reviewed by the Emissions Measurement Team to confirm the validity of the data. The VP-Measurement Technologies reviews and approves the recommendation, if any, that individual sample data should be invalidated. Invalidated data are not used in subsequent calculations.

3.0 Test Results

The average emission results, in pounds per pound of binder used, are presented in Table 3-1.

The average emission results, in pounds per ton of sand used, are presented in Table 3-2.

The amount of available VOCs for this binder system was determined using a method based on US EPA Method 24 and found to be 0.33 pounds per pound of binder or 33% of the binder weight. This data is presented in Table 3-3

Table 3-4 contains average test process and source data. The total binder weight and the total core weight were calculated from the total amount of sand and the percent binder used in each section of the test.

Appendix B contains the detailed emissions and process data.

Figure 3-1 shows the data from Table 3-1 while Figure 3-2 shows the data from Table 3-2.

Table 3-1 Average Emission Results – Lb/Lb Binder

Core Mixing

Analytes	Average	STDEV
TGOC as Propane	0.0041	<0.0001
HC as Hexane	0.0021	<0.0003
Sum of VOCs	<0.0001	<0.0001
Sum of HAPs	<0.0001	<0.0001
Sum of POMs	ND	NA
Individual Organic HAPs and VOCs		
Phenol	<0.0001	<0.0001
Formaldehyde	<0.0001	<0.0001
o-Cresol	ND	NA
1-Methylnaphthalene	ND	NA
2-Methylnaphthalene	ND	NA
Naphthalene	ND	NA

ND = Not Detected: **NA** = Not Applicable

Table 3-1 Average Emission Results – Lb/Lb Binder (continued)

Core Making

Analytes	Average	STDEV
HC as Hexane	0.0752	0.0051
Sum of VOCs	0.0014	<0.0002
Sum of HAPs	0.0014	<0.0002
Sum of POMs	0.0010	<0.0002
Individual Organic HAPs and VOCs		
2-Methylnaphthalene	0.0004	<0.0001
Naphthalene	0.0003	<0.0001
Phenol	0.0003	<0.0001
1-Methylnaphthalene	0.0003	<0.0001
Formaldehyde	0.0001	<0.0001
o-Cresol	ND	NA

ND = Not Applicable: NA = Not Applicable

Core Storage

Analytes	Average	STDEV
HC as Hexane	0.0171	0.0019
Sum of VOCs	0.0008	0.0001
Sum of HAPs	0.0008	0.0001
Sum of POMs	0.0007	0.0001
Individual Organic HAPs and VOCs		
2-Methylnaphthalene	0.0003	<0.0001
Naphthalene	0.0003	<0.0001
1-Methylnaphthalene	0.0002	<0.0001
Formaldehyde	<0.0001	<0.0001
o-Cresol	ND	NA
Phenol	ND	NA

ND = Not Detected: NA = Not Applicable

Table 3-2 Average EQ Emission Results – Lb/Tn Sand

Core Mixing

Analytes	Average	STDEV
TGOC as Propane	0.1392	0.0021
HC as Hexane	0.0889	0.0564
Sum of VOCs	0.0031	0.0001
Sum of HAPs	0.0031	0.0001
Sum of POMs	ND	NA
Individual Organic HAPs and VOCs		
Phenol	0.0030	0.0001
Formaldehyde	0.0001	<0.0001
o-Cresol	ND	NA
1-Methylnaphthalene	ND	NA
2-Methylnaphthalene	ND	NA
Naphthalene	ND	NA

ND = Not Detected: NA = Not Applicable

Core Making

Analytes	Average	STDEV
HC as Hexane	2.7191	0.3557
Sum of VOCs	0.0534	0.0149
Sum of HAPs	0.0534	0.0149
Sum of POMs	0.0398	0.0144
Individual Organic HAPs and VOCs		
Phenol	0.0108	0.0006
Formaldehyde	0.0028	0.0006
o-Cresol	ND	NA
1-Methylnaphthalene	0.0102	0.0044
2-Methylnaphthalene	0.0165	0.0057
Naphthalene	0.0131	0.0043

ND = Not Detected: NA = Not Applicable

Core Storage

Analytes	Average	STDEV
HC as Hexane	0.6005	0.0696
Sum of VOCs	0.0264	0.0044
Sum of HAPs	0.0264	0.0044
Sum of POMs	0.0259	0.0044
Individual Organic HAPs and VOCs		
Phenol	ND	NA
Formaldehyde	0.0005	0.0002
o-Cresol	ND	NA
1-Methylnaphthalene	0.0075	0.0015
2-Methylnaphthalene	0.0093	0.0015
Naphthalene	0.0090	0.0014

ND = Not Detected: NA = Not Applicable

Table 3-3 Average Emission Results – % Available Solvent

Analyte	Mixing	Gas/Purge Fugitives	Storage
HC as Hexane	0.6%	23.6%	5.1%

Table 3-4 Average Process and Source Data

Parameter	Mixing	Gas/Purge Fugitives	Storage
Available Solvent (lb)	0.289	1.21	0.042
Calculated Total Binder Weight (lb)	0.875	3.67	0.127
Calculated Total Sand Weight (lb)	50.2	209.9	7.2
Average Binder Percentage (BOS)	1.74	1.75	1.75
Test Run Duration (min)	7	30	300
Volumetric Flow Rate (cfm)	1.05	320	.33
Core Machine Cycle Time (min)	---	1.2	---
Purge Duration (sec)	---	20	---

Figure 3-1 Average Emission Results – Lb/Lb Binder

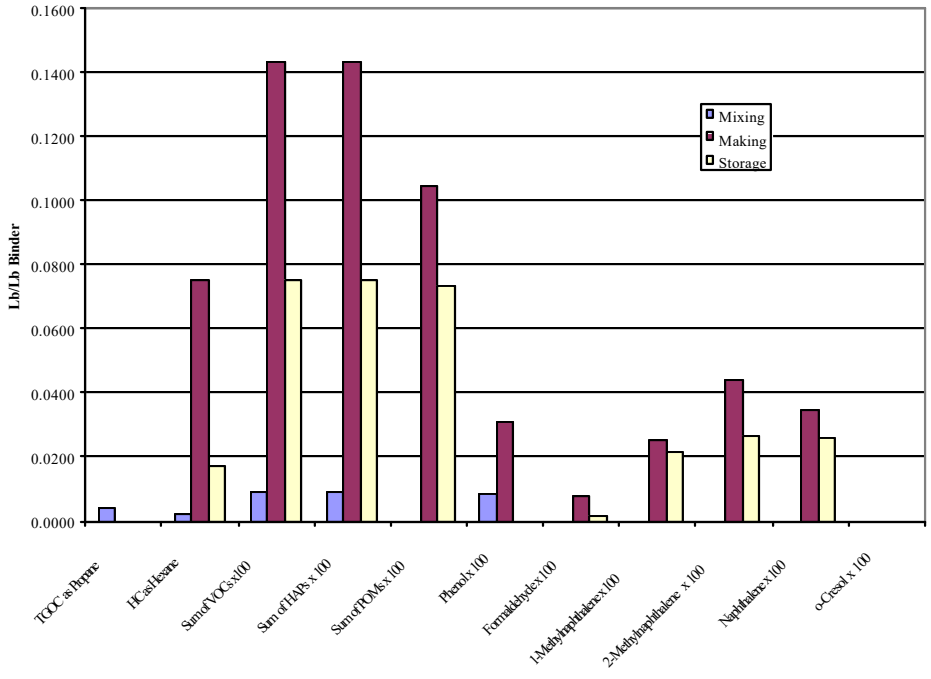
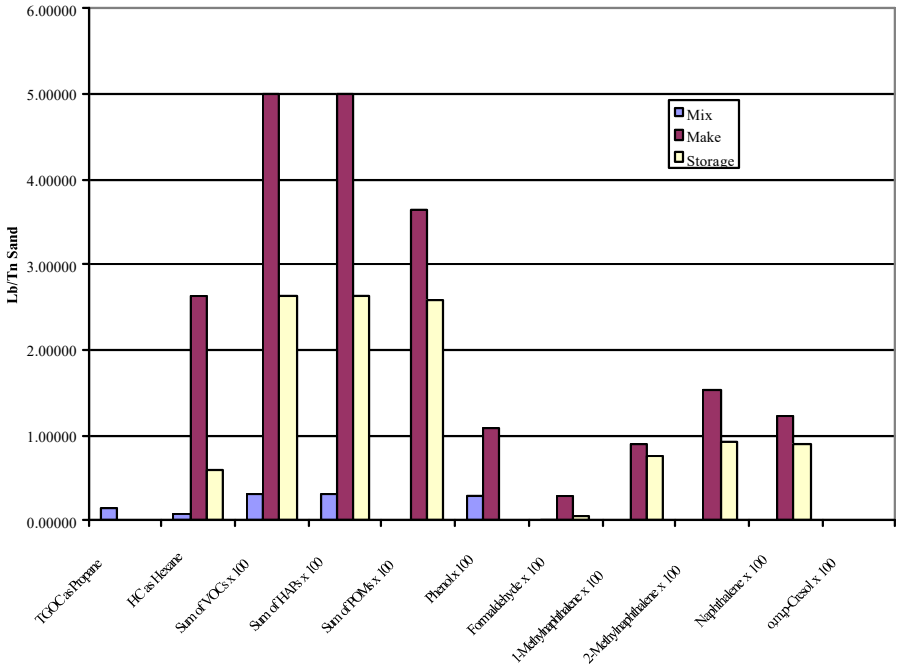


Figure 3-2 Average Emission Results – Lb/Tn Sand



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4.0 Discussion of Results

Volatile organic compound (VOC), hazardous air pollutant (HAP), and polycyclic organic material (POM) emissions were measured during core making activities associated with the use of a phenolic urethane binder system in the Technikon research and development core production facility. All of the core-making measurements were conducted within enclosures meeting the criteria for a temporary total enclosure according to US EPA Method 204.

Mixing

The mixing HAP emissions mainly consisted of phenol and formaldehyde. The HC as Hexane results for mixing contributed approximately 2% of the total found during these three test segments.

Gas/Purge and Fugitives

The HC as hexane results for gas/purge and fugitive emissions contributed approximately 80% of the total found during these three test segments.

Storage

The storage segment contributed 18% of the total found during these three test segments.

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APPENDIX A APPROVED TEST PLAN AND SAMPLE PLAN

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TECHNIKON TEST PLAN

CONTRACT NUMBER: 1409 **TASK NUMBER:** 1.2.3

WORK ORDER NUMBER: 1165 **SERIES:** EQ

SAMPLE EVENTS: EQ001-009 mix, EQ021-029 make, EQ031-039 store

SITE: ___PRE-PRODUCTION (243) _X__ FOUNDRY(238)

TEST TYPE: Capability, core mixing, core making, core storage baseline 2002

METAL TYPE: None

MOLD TYPE: None

NUMBER OF MOLDS: NonE

CORE TYPE: AFS Step Core, Ashland Isocure ® LF305/52-904GR Phenolic urethane binder, TEA catalyzed

TEST DATE: **START:** 19 Aug 2002

FINISHED: 13 Sep 2002

TEST OBJECTIVES:

1. Develop facility and methods to make a core mix, make, and store baseline having significantly reduced process variability and improved independent sample capture methods.

2. Measure selective HAP and VOC emissions from Core sand mixing, Gas & Purge and Fugitive Core Making, and Core Storage of AFS step cores made with 1.75% Ashland binder to make a 2002 Core baseline.

VARIABLES:

1. Core sand mixing: The uncoated sand shall be Wexford W450 Lakesand. It shall be preheated or cooled to maintain a temperature of 85 +/- 5 degrees Fahrenheit. The binder shall be 1.75 +/- .0175% Ashland 305/52-904 mixed Part I/Part II in the ratio of 55/45. The sand will be coated in the Redford/Carver 50 pound core sand mixer for 7 minutes. One minute shall be used to dispense the sand and the two binder components and one additional minute shall be used strictly for discharging the muller. Each core sand mixing test shall be one seven (7) minute 50-pound cycle within the muller only monitored continuously by TGOC and adsorption tube sampling. Prior to the first test five (5) batches shall be run to the storage hopper to normalize the background. Sampling media will be changed after each one-cycle test, during which time mixing will continue in order to maintain the background concentration. A total of nine (9) mixing tests shall be run.

2. Core Making: The Redford/Carver core machine will operate on a nominal one (1) minute door-to-door cycle. The environmental enclosure shall be supplied with air controlled to 82 +/- 5 degrees Fahrenheit. TEA will be fed to the core machine at a nominal 5 grams per cycle. The purge pressure shall be 20+/-2 psi. The core-make test will begin after the

core machine has run sufficient time, at rate, to have the background emission concentration stabilize. Each core-make test will be 30 core cycles, about one half hour long, with continuous TGOC and adsorption tube sampling. Sample media will be changed after each 30-cycle test. The core machine will run continuously during media change and testing to maintain the background concentration. The gas & purge and fugitive emissions will be collected to a common sampling stack.

3. Core Storage: The store test will consist of weighed cores sampled four (4) at a time, from the core machine and placed in individual sampling domes. The domes are in a temperature-controlled room at 82+/- 5 degrees Fahrenheit and sampled continuously with TGOC and adsorption tubes for 5 hours.

BRIEF OVERVIEW: Core making is not a single process but rather a series of steps, each with its own process collectable and fugitive emissions. This test will look at selected HAP & VOC emissions from combined process collectable and fugitive emission streams during each of the core sand mixing, core making, and core storage steps.

SPECIAL CONDITIONS: The sand mixer will have a removable lid that allows air to infiltrate radially from the perimeter. Materials will be charged though a closeable door in the lid. Samples will be extracted from the center of the headspace below the lid. The core machine with step core tooling shall be housed in a double walled emission enclosure. The area between the walls shall be flushed with temperature-controlled air at 80+/-5 degrees Fahrenheit. This air shall be the ambient make up air for the core process within the enclosure. The core box and core machine shall be tightly plumbed to extract gasses passed through the core box into a common sampling stack with the fugitive gasses. The sampling environment will be maintained at 75-85°F.

Original Signed
Process Engineering Manager (Technikon) **Date**

Original Signed
V.P. Measurement Technology (Technikon) **Date**

Original Signed
V.P. Operations (Technikon) **Date**

Original Signed
CERP Representative **Date**

Series EQ (Baseline)

Core Sand Mixing, Curing, and Storage

A. The Experiment:

1. Design and develop improved capability to evaluate the standard emissions from the mixing, making, and storage of gas catalyzed cold reacting core sand mixtures.
2. Evaluate the emissions from Ashland ISOCURE® LF305/52-904 part I and part II binder system to form a mixing, making, storage baseline for Iron-Phenolic Urethane binder systems.

B. Capability Study:

1. Mixing: Design and manufacture a capture hood for the Carver 50 pound capacity core sand mixer consisting of:

   a. An annular air makeup port which allows air to enter the mixer radially in such a way as to not significantly affect the emission evaporation from the sand surface.
   b. The ventilation rate shall be sufficient to prevent escape of the emissions except to the emission-sampling stream.
   c. An emission sampling port centered on the capture hood.
   d. A discharge pipe connected to a sampling train and pump via a heated line to the THC analyzer.

2. Core Making: Design and manufacture a total emission enclosure to capture and sample aggregate emissions from both the core box gas-purge cycles and fugitives from the enclosure.

   a. A gassing head capable of independently delivering a catalyzing gas and purge air from the external Luber gas generator to the common fugitives collection pipe. The flow rate in the sampling pipe at the sampling location must be virtually independent of the whether the gas-purge cycle is active.

3. Storage: Design and manufacture a set of four-storage emission sampling chambers.

   a. Each chamber shall have independent air flow controls.
   b. The sum of the chamber flows shall not exceed 50 liters/minute.
   c. One chamber shall be connected to the THC analyzer.
   d. Three chambers shall be connected to a sampling train via independent sampling media.

4. Conduct a set of preliminary tests to verify that the design criteria are met.

a. Conduct a "mixedness" test to verify that the mixer will create a homogeneous mixture within the prescribed mixing time.
b. Conduct a THC mixing calibration run according to the mixing schedule described below in order to determine the required media flow rates.
c. Conduct a THC core making calibration at 60 core /hour in order to determine the required media flow rates.
d. Conduct a THC core storage calibration run using core made per the core make procedure in order to determine the required media flow rates.
e. Record the ambient air temperature, pressure, and moisture content; scavenging air velocity; all machine parameters; all core weights; and all events.

C. Mixing Test: Nine discrete seven (7) minute batches run contiguously.

1. The test shall be conducted in the 50-pound Carver core sand mixer fitted with the capture hood with make-up air ventilation.

a. The emission sample shall be taken from the air space above the mixing sand.

2. Mixing

a. Turn on the Kloster sand heater/cooler. Adjust the set point so that sand is delivered to the mixer in the temperature range of 80-90°F.
b. Attach the emission sampling equipment to the 50-pound Carver core sand mixer.
c. Pre-measure 1.75% (BOS) Ashland ISOCURE® binder based on a 50 pound batch.

1) Part I (LF305) is 55% of the total resin and is 218.3 grams.
2) Part II (52-904) is 45% of the total resin and is 178.6 grams

Note: pre-wet the dispensing cup and tare the wet cup.

d. Pre-Weigh 50 pounds of Wexford W450 Lake Sand, heated to 80-90°F in the Kloster sand heater/cooler, in the Simpson Technologies weight system.
e. Place the capture hood on top of the mixer. Start the mixer.
f. Start the timer. Start monitoring with the THC only. Monitor with the THC continuously until the end of the test.
g. Make five (5) emission background-generating batches.
h. The procedure for this and the contiguously run test batches shall be as follows: Add the 50 pounds of raw sand, about 20-25 seconds, followed by the binder part I dispensed over 20 seconds, followed by binder part II dispensed over 20 seconds. All materials should be in the mixer within 50-70 seconds from start of the batch. Mix each batch until a total of 6 minutes have elapsed, then discharge the batch until a total of 7 minutes has elapsed from the start of the batch. Be prepared to recharge the mixer for the next batch immediately at the end of each 7-minute period.
i. During this activity the next set of components must be weighed and made ready. Having two or three material sets weighed and protected at all times makes the process go smoothly.

j. At the end of fifth batch (35 minutes)

1) Close the discharge door.
2) Open the sample train to the mixer.
3) The emission sample size will be one (1) batch.
4) During the next batch the media will be changed.
5) The next batch will be an emission sample again.
6) Continue alternating until nine (9) emission tests are complete.

k. Repeat steps C.2.g-h for as many cycles as is necessary to complete the five (5) background batches, the nine (9) emission test batches, and nine (9) media changing periods, a total of 23 batches. Continue batches uninterrupted during media changes between tests.

D. Core Making test: Nine (9) tests each having thirty (30) approximately one (1) minute core cycles.

1. Turn on the core storage room temperature control system 24 hours ahead of expected use time. Set control so that the core machine sees 80°F.
2. Turn on and adjust the Luber TEA gas generator.

a. Make sure there is enough TEA in the Luber TEA storage tank.
b. Set the MAX WORKING PRESSURE to 45 psi.
c. Set the gassing time (T1) to 0.75 seconds
d. Adjust the TEA flow rate to .019 pounds/second.

Note: This will give an amine input of 5.1 grams per cycle.

e. Leave the Timer TR1 at 0.3 seconds, the proportional valve voltage at 7.5 volts and timer at 3 seconds, the low purge pressure at 10 psi and high purge pressure at 45 psi.

Note: This should yield a working pressure of about 7 psi.

f. Connect the TEA weighing container to the Luber supply line.

1) Dispense about 250 grams of TEA into the weigh container. The scale has a 300-gram capacity.
2) Isolate the Luber TEA storage tank.

g. Conduct 5 gassing purge cycles within ½ hour of testing to stabilize the Luber generator.

1) Vent this material to the scrubber.
2) Record the TEA weight dispensed.

h. Record the ambient temperature, the inlet pressure, Max working pressure, working pressure, TEA flow rate, gassing timer value, & purge timer value.

3. Attach the emission sample train to the gas-purge-fugitive sample pipe.
4. Begin monitoring with the THC.
5. Prepare the core sand in the Carver mixer according to section C.2.g-h except without the emission sampling equipment attached to the mixer.
6. Prepare the core machine emission enclosure.
7. Verify that the temperature controlled core test room is set to deliver air at 75-85°F to the core enclosure.
8. Set up the Redford/Carver core machine with the step core corebox.
9. Verify that the air temperature in the gas-purge-fugitive exhaust tube is 75-85 degrees Fahrenheit.
10. Set the Redford/Carver core machine to gas for 0.75 seconds with zero (0) second delay after gassing and twenty (20) second purge. Total cycle time to be one (1) minute. Set the cycle counter to zero (0).
11. Start and calibrate the Luber TEA vaporizer to dispense 5.0-5.2 grams of TEA per machine cycle.
12. Mix core sand per section C.2.g-h, as required, in fifty (50) pound batches to assure continuity of production.
13. Cycle the core machine for 10-15 cycles or until fugitives emissions are stable based on the THC and good core manufacture is achieved. Note: if release agent is required brush release agent on to core box do not spray.
14. Make cores continuously as above. Any stoppage will impact the fugitives emission level.
15. Record the number and weight of each core throughout the test.
16. When everybody is ready, start the emission-sampling clock and open the sample train. Sample continuously for 30 core cycles, approximately thirty (30) minute, then close the sample train.
17. Do not stop making core.
18. Set up the sample train again and repeat the test for another thirty-core test. A total of nine (9) half-hour tests are to be performed.
19. Empty and clean the core machine and core sand mixer.

E. Core storage tests.

1. Prepare the 4 individual core storage emission enclosures.
2. Set up a THC to monitor one enclosure and the sample train to monitor the other three enclosures and calibrate them.
3. Mix sand by the method of section C.2.g-h.
4. Make core by the method of Section D.
5. Number, weigh, and record each core.
6. When good core are being made sample four (4) cores whose weight is 7.30, 7.35, or 7.40 pounds for the storage test. Place these cores in the core storage emission enclosures.

7. Close the enclosure bonnet, start the test clock, open to the THC or the sample train.
8. Record the start time for each core as well as the core weight
9. Continue sampling train for 5 hours then close the sample train. Separate longer tests may be conducted by this procedure at the discretion of the emission team.
10. Continue the THC monitoring for 24 hours.
11. Repeat this procedure to obtain nine (9) discrete tests plus the THC monitoring.

Steven Knight
Mgr. Process Engineering

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 1											
THC	EQ-00101	X									TOTAL
NIOSH 1500	EQ-00102		1						20	1	100/50 mg Charcoal (SKC 226-01)
NIOSH 1500	EQ-00103			1					20	2	400/200 mg Charcoal (Orbo 32)
NIOSH 1500	EQ-00104				1						400/200 mg Charcoal (Orbo 32)
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00105		1						1000	8	400/200 mg Silica Gel (Orbo 53)
NIOSH 2002	EQ-00106			1					1000	9	400/200 mg Silica Gel (Orbo 53)
NIOSH 2002	EQ-00107				1						400/200 mg Silica Gel (Orbo 53)
TO11	EQ-00108		1						1000	10	(DNPH cartridge sep-pak)
TO11	EQ-00109				1				1000	11	(DNPH cartridge sep-pak)
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 2											
THC	EQ-00201	X									TOTAL
NIOSH 1500	EQ-00202		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00203		1						1000	8	400/200 mg Silica Gel (Orbo 53)
TO11	EQ-00204		1						1000	9	(DNPH cartridge sep-pak)
TO11	EQ-00205			1					1000	10	(DNPH cartridge sep-pak)
									1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 3											
THC	EQ-00301	X									TOTAL
NIOSH 1500	EQ-00302		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00303		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-00304		1						1000	10	(DNPH cartridge sep-pak)
TO11	EQ-00305					1			1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 4											
THC	EQ-00401	X									TOTAL
NIOSH 1500	EQ-00402		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00403		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-00404		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 5											
THC	EQ-00501	X									TOTAL
NIOSH 1500	EQ-00502		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00503		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-00504		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 6											
THC	EQ-00601	X									TOTAL
NIOSH 1500	EQ-00602		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00603		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-00604		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 7											
THC	EQ-00701	X									TOTAL
NIOSH 1500	EQ-00702		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00703		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-00704		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 8											
THC	EQ-00801	X									TOTAL
NIOSH 1500	EQ-00802		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00803		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-00804		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 9											
THC	EQ-00901	X									TOTAL
NIOSH 1500	EQ-00902		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-00903		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-00904		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 10											
THC	EQ-01001	X									TOTAL
NIOSH 1500	EQ-01002		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-01003		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-01004		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 11											
THC	EQ-01101	X									TOTAL
NIOSH 1500	EQ-01102		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-01103		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-01104		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 12											
THC	EQ-01201	X									TOTAL
NIOSH 1500	EQ-01202		1						20	1	400/200 mg Charcoal (Orbo 32)
	Excess								20	2	Excess
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-01203		1						1000	8	400/200 mg Silica Gel (Orbo 53)
	Excess								1000	9	Excess
TO11	EQ-01204		1						1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MIXING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/9/02											
EVENT 13											
THC	EQ-01301	X									TOTAL
NIOSH 1500	EQ-01302		1						20	1	100/50 mg Charcoal (SKC 226-01)
NIOSH 1500	EQ-01303			1					20	2	400/200 mg Charcoal (Orbo 32)
	Excess								45	3	Excess
	Excess								35	4	Excess
	Excess								60	5	Excess
	Excess								750	6	Excess
	Excess								900	7	Excess
NIOSH 2002	EQ-01305		1						1000	8	400/200 mg Silica Gel (Orbo 53)
NIOSH 2002	EQ-01306			1					1000	9	400/200 mg Silica Gel (Orbo 53)
TO11	EQ-01308		1						1000	10	(DNPH cartridge sep-pak)
TO11	EQ-01309					1			1000	10	(DNPH cartridge sep-pak)
	Excess								1000	11	
	Excess								200	12	Excess
	Excess								22000	13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 1											
THC	EQ-02101	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02102		1						500	5	100/50 mg Charcoal (SKC 226-01)
NIOSH 1500	EQ-02103			1					500	6	100/50 mg Charcoal (SKC 226-01)
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02104		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
NIOSH 2002	EQ-02105			1					1000	10	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02106		1						1000	11	(DNPH cartridge sep-pak)
	Excess									12	Excess
	Excess									13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 2											
THC	EQ-02201	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02202		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02203		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02204		1						1000	10	(DPNH cartridge sep-pak)
	EQ-02205			1					1000	11	(DPNH cartridge sep-pak)
	Excess									12	Excess
	Excess									13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 3											
THC	EQ-02301	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02302		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02303		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02304		1						1000	10	(DPNH cartridge sep-pak)
TO11	EQ-02305					1			1000	10	(DPNH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess									12	Excess
	Excess									13	

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 4											
THC	EQ-02401	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02402		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02403		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02404		1						1000	10	(DPNH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess									12	Excess
	Excess									13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 5											
THC	EQ-02501	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02502		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02503		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02504		1						1000	10	(DPNH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess									12	Excess
	Excess									13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 6											
THC	EQ-02601	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02602		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02603		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02604		1						1000	10	(DPNH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess									12	Excess
	Excess									13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 7											
THC	EQ-02701	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02702		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02703		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02704		1						1000	10	(DPNH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess									12	Excess
	Excess									13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											
EVENT 8											
THC	EQ-02801	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02802		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02803		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02804		1						1000	10	(DPNH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess									12	Excess
	Excess									13	Excess

CORE MAKING EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											**30 Minute Test**
EVENT 9											
THC	EQ-02901	X									TOTAL
	Excess									1	Excess
	Excess									2	Excess
	Excess									3	Excess
	Excess									4	Excess
NIOSH 1500	EQ-02902		1						500	5	100/50 mg Charcoal (SKC 226-01)
	Excess								500	6	Excess
	Excess									7	Excess
	Excess									8	Excess
NIOSH 2002	EQ-02903		1						1000	9	150/75 mg Silica Gel (SKC 226-10)
TO11	EQ-02904		1						1000	10	(DPNH cartridge sep-pak)
	Excess								1000	11	Excess
	Excess									12	Excess
	Excess									13	Excess

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/10/02											**5-Hr. Test-Core 1**
EVENT 1											
NIOSH 1500	EQ-03101		1						25	1	100/50 mg Charcoal (SKC 226-01)
NIOSH 1500	EQ-03102			1					25	2	100/50 mg Charcoal (SKC 226-01)
NIOSH 2002	EQ-03103		1						60	3	150/75 mg Silica Gel (SKC 226-10)
NIOSH 2002	EQ-03104			1					30	4	150/75 mg Silica Gel (SKC 226-10)
TO-11	EQ-03105		1						200	5	(DPNH cartridge sep-pak)
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/10/02											**5 Hour Test-Core 2**
EVENT 2											
NIOSH 1500	EQ-03201		1						30	1	100/50 mg Charcoal (SKC 226-01)
	Excess								20	2	Excess
NIOSH 2002	EQ-3202		1						60	3	150/75 mg Silica Gel (SKC 226-10)
TO-11	EQ-3203		1						200	4	(DPNH cartridge sep-pak)
TO-11	EQ-3204			1					200	5	(DPNH cartridge sep-pak)
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/10/02											**5 Hour Test-Core 3**
EVENT 3											
NIOSH 1500	EQ-03301		1						30	1	100/50 mg Charcoal (SKC 226-01)
	Excess								30	2	Excess
NIOSH 2002	EQ-03302		1						60	3	150/75 mg Silica Gel (SKC 226-10)
TO-11	EQ-03303		1						200	4	(DPNH cartridge sep-pak)
TO-11	EQ-03304					1			200	4	(DPNH cartridge sep-pak)
	Excess								200	5	Excess
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											**5 Hour Test-Core 4**
EVENT 4											
NIOSH 1500	EQ-03401		1						25	1	100/50 mg Charcoal (SKC 226-01)
	Excess								25	2	Excess
NIOSH 2002	EQ-03402		1						60	3	150/75 mg Silica Gel (SKC 226-10)
	Excess								30	4	Excess
TO-11	EQ-03403		1						200	5	(DPNH cartridge sep-pak)
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											**5 Hour Test-Core 5**
EVENT 5											
NIOSH 1500	EQ-03501		1						30	1	100/50 mg Charcoal (SKC 226-01)
	Excess								20	2	Excess
NIOSH 2002	EQ-03502		1						60	3	150/75 mg Silica Gel (SKC 226-10)
TO-11	EQ-03503		1						200	4	(DPNH cartridge sep-pak)
	Excess								200	5	Excess
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											**5 Hour Test-Core 6**
EVENT 6											
NIOSH 1500	EQ-03601		1						30	1	100/50 mg Charcoal (SKC 226-01)
	Excess								30	2	Excess
NIOSH 2002	EQ-03602		1						60	3	150/75 mg Silica Gel (SKC 226-10)
TO-11	EQ-03603		1						200	4	(DPNH cartridge sep-pak)
	Excess								200	5	Excess
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											**5 Hour Test-Core 7**
EVENT 7											
NIOSH 1500	EQ-03701		1						25	1	100/50 mg Charcoal (SKC 226-01)
	Excess								25	2	Excess
NIOSH 2002	EQ-03702		1						60	3	150/75 mg Silica Gel (SKC 226-10)
	Excess								30	4	Excess
TO-11	EQ-03703		1						200	5	(DPNH cartridge sep-pak)
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											**5 Hour Test-Core 8**
EVENT 8											
NIOSH 1500	EQ-03801		1						30	1	100/50 mg Charcoal (SKC 226-01)
	Excess								20	2	Excess
NIOSH 2002	EQ-03802		1						60	3	150/75 mg Silica Gel (SKC 226-10)
TO-11	EQ-03803		1						200	4	(DPNH cartridge sep-pak)
	Excess								200	5	Excess
	Excess								Variable	6	No Critical Orifice

CORE STORAGE EQ - SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
9/11/02											**5 Hour Test-Core 9**
EVENT 9											
NIOSH 1500	EQ-03901		1						30	1	100/50 mg Charcoal (SKC 226-01)
	Excess								30	2	Excess
NIOSH 2002	EQ-03902		1						60	3	150/75 mg Silica Gel (SKC 226-10)
TO-11	EQ-03903		1						200	4	(DPNH cartridge sep-pak)
	Excess								200	5	Excess
	Excess								Variable	6	No Critical Orifice

APPENDIX B DETAILED TEST AND PROCESS DATA

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Individual Mixing Test Results – Lb/Lb Binder

Core Mixing 1.75% Binder

HAPs	POMs	Compound/Sample Number	EQ004	EQ005	EQ006	EQ007	EQ008	EQ009	EQ010	EQ011	EQ012	Average	STDEV
		Test Dates	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02		
		TGOC as Propane	4.20E-03	4.00E-03	4.00E-03	4.00E-03	4.10E-03	4.00E-03	4.00E-03	4.00E-03	4.10E-03	4.04E-03	7.26E-05
		HC as Hexane	2.23E-03	1.43E-03	1.79E-03	2.05E-03	2.10E-03	2.17E-03	1.99E-03	2.43E-03	2.31E-03	2.06E-03	2.98E-04
		Sum of VOCs	9.33E-05	8.88E-05	9.15E-05	8.97E-05	8.52E-05	8.97E-05	8.90E-05	8.88E-05	9.95E-05	9.06E-05	3.97E-06
		Sum of HAPs	9.33E-05	8.88E-05	9.15E-05	8.97E-05	8.52E-05	8.97E-05	8.90E-05	8.88E-05	9.95E-05	9.06E-05	3.97E-06
		Sum of POMs	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
			Individual Organic HAPs and VOCs										
x		Phenol	8.98E-05	8.54E-05	8.81E-05	8.63E-05	8.18E-05	8.63E-05	8.55E-05	8.53E-05	9.61E-05	8.72E-05	3.98E-06
x		Formaldehyde	3.50E-06	3.42E-06	3.37E-06	3.41E-06	3.42E-06	3.48E-06	3.49E-06	3.53E-06	3.42E-06	3.45E-06	5.47E-08
x		o-Cresol	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
x	z	1-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
x	z	2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
x	z	Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA

ND: Non Detect; **NA:** Not Applicable
Formaldehyde results reported as a mimimum.

Individual Gas/Purge and Fugitive Test Results – Lb/Lb Binder

Core Making 1.75% Binder

HAPs	POMs	Compound/Sample Number	EQ021	EQ022	EQ023	EQ024	EQ025	EQ026	EQ027	EQ028	EQ029	Average	STDEV
		Test Dates	9/11/02	9/11/02	9/11/02	9/11/02	9/11/02	9/12/02	9/12/02	9/12/02	9/12/02		
		TGOC as Propane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		HC as Hexane	7.29E-02	7.70E-02	7.83E-02	8.51E-02	7.96E-02	6.93E-02	7.29E-02	7.04E-02	7.15E-02	7.52E-02	5.14E-03
		Sum of VOCs	1.14E-03	1.70E-03	1.58E-03	1.68E-03	1.40E-03	1.22E-03	1.32E-03	1.38E-03	1.49E-03	1.43E-03	1.96E-04
		Sum of HAPs	1.14E-03	1.70E-03	1.58E-03	1.68E-03	1.40E-03	1.22E-03	1.32E-03	1.38E-03	1.49E-03	1.43E-03	1.96E-04
		Sum of POMs	7.58E-04	1.27E-03	1.21E-03	1.27E-03	1.07E-03	8.32E-04	9.07E-04	9.73E-04	1.10E-03	1.04E-03	1.88E-04
			Individual Organic HAPs and VOCs										
x	z	2-Methylnaphthalene	3.04E-04	5.49E-04	5.08E-04	5.47E-04	4.52E-04	3.47E-04	3.69E-04	4.08E-04	4.58E-04	4.38E-04	8.77E-05
x	z	Naphthalene	2.77E-04	4.47E-04	3.96E-04	4.00E-04	3.44E-04	2.80E-04	3.16E-04	3.21E-04	3.66E-04	3.50E-04	5.77E-05
x		Phenol	2.98E-04	3.41E-04	2.92E-04	3.30E-04	2.98E-04	3.07E-04	3.15E-04	3.15E-04	2.97E-04	3.10E-04	1.67E-05
x	z	1-Methylnaphthalene	1.77E-04	2.77E-04	3.04E-04	3.23E-04	2.70E-04	2.06E-04	2.22E-04	2.45E-04	2.77E-04	2.55E-04	4.73E-05
x		Formaldehyde	8.02E-05	9.05E-05	8.03E-05	7.81E-05	3.39E-05	8.35E-05	9.37E-05	8.95E-05	9.15E-05	8.01E-05	1.83E-05
x		o-Cresol	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA

ND: Non Detect; **NA:** Not Applicable

Individual Storage Test Results – Lb/Lb Binder

Core Storage 1.75% Binder

HAPs	POMs	Compound/Sample Number	EQ031	EQ032	EQ033	EQ034	EQ035	EQ036	EQ037	EQ038	EQ039	Average	STDEV
		Test Dates	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02		
		TGOC as Propane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		HC as Hexane	1.71E-02	1.47E-02	1.80E-02	I	1.74E-02	2.09E-02	1.54E-02	1.59E-02	1.74E-02	1.71E-02	1.91E-03
		Sum of VOCs	8.64E-04	6.08E-04	8.66E-04	I	7.18E-04	8.92E-04	5.80E-04	6.78E-04	8.04E-04	7.51E-04	1.22E-04
		Sum of HAPs	8.64E-04	6.08E-04	8.66E-04	I	7.18E-04	8.92E-04	5.80E-04	6.78E-04	8.04E-04	7.51E-04	1.22E-04
		Sum of POMs	8.46E-04	5.92E-04	8.48E-04	I	7.11E-04	8.84E-04	5.64E-04	6.61E-04	7.85E-04	7.36E-04	1.23E-04
			Individual Organic HAPs and VOCs										
x	z	2-Methylnaphthalene	3.16E-04	2.13E-04	2.96E-04	I	2.53E-04	3.09E-04	2.11E-04	2.34E-04	2.96E-04	2.66E-04	4.34E-05
x	z	Naphthalene	2.90E-04	1.99E-04	2.86E-04	I	2.48E-04	3.08E-04	2.05E-04	2.43E-04	2.78E-04	2.57E-04	4.01E-05
x	z	1-Methylnaphthalene	2.41E-04	1.79E-04	2.66E-04	I	2.10E-04	2.67E-04	1.48E-04	1.84E-04	2.10E-04	2.13E-04	4.27E-05
x		Formaldehyde	1.75E-05	1.69E-05	1.84E-05	I	7.16E-06	8.16E-06	1.63E-05	1.68E-05	1.83E-05	1.49E-05	4.56E-06
x		o-Cresol	ND	ND	ND	I	ND	ND	ND	ND	ND	NA	NA
x		Phenol	ND	ND	ND	I	ND	ND	ND	ND	ND	NA	NA

I: Data rejected based on data validation considerations
ND: Non Detect; **NA:** Not Applicable

Individual Results for Test EQ – Lb/Tn Sand

Core Mixing 1.75% Binder

HAPs	POMs	Compound/Sample Number	EQ004	EQ005	EQ006	EQ007	EQ008	EQ009	EQ010	EQ011	EQ012	Average	STDEV
		Test Dates	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002		
		TGOC as Propane	1.44E-01	1.37E-01	1.38E-01	1.38E-01	1.41E-01	1.39E-01	1.39E-01	1.39E-01	1.41E-01	1.39E-01	2.18E-03
		HC as Hexane	7.59E-02	4.88E-02	6.10E-02	7.06E-02	7.22E-02	7.47E-02	6.84E-02	8.36E-02	7.95E-02	7.05E-02	1.04E-02
		Sum of VOCs	3.18E-03	3.02E-03	3.12E-03	3.08E-03	2.93E-03	3.09E-03	3.06E-03	3.05E-03	3.42E-03	3.11E-03	1.36E-04
		Sum of HAPs	3.18E-03	3.02E-03	3.12E-03	3.08E-03	2.93E-03	3.09E-03	3.06E-03	3.05E-03	3.42E-03	3.11E-03	1.36E-04
		Sum of POMs	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
		Individual Organic HAPs and VOCs											
x		Phenol	3.06E-03	2.91E-03	3.00E-03	2.97E-03	2.81E-03	2.97E-03	2.94E-03	2.93E-03	3.30E-03	2.99E-03	1.36E-04
x		Formaldehyde	1.19E-04	1.16E-04	1.15E-04	1.17E-04	1.17E-04	1.20E-04	1.20E-04	1.21E-04	1.17E-04	1.18E-04	2.07E-06
x		o-cresol	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
x	z	1-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
x	z	2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
x	z	Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA

ND: Non Detect; **NA;** Not Applicable

Formaldehyde results reported as a minimum due to apparent breakthrough.

Core Making 1.75% Binder

HAPs	POMs	Compound/Sample Number	EQ021	EQ022	EQ023	EQ024	EQ025	EQ026	EQ027	EQ028	EQ029	Average	STDEV
		Test Dates	9/11/2002	9/11/2002	9/11/2002	9/11/2002	9/11/2002	9/12/2002	9/12/2002	9/12/2002	9/12/2002		
		TGOC as Propane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		HC as Hexane	2.54E+00	2.69E+00	2.74E+00	2.98E+00	2.79E+00	2.41E+00	2.53E+00	2.47E+00	2.51E+00	2.63E+00	1.84E-01
		Sum of VOCs	3.96E-02	5.95E-02	5.54E-02	5.87E-02	4.90E-02	4.25E-02	4.58E-02	4.82E-02	5.21E-02	5.01E-02	6.94E-03
		Sum of HAPs	3.96E-02	5.95E-02	5.54E-02	5.87E-02	4.90E-02	4.25E-02	4.58E-02	4.82E-02	5.21E-02	5.01E-02	6.94E-03
		Sum of POMs	2.64E-02	4.44E-02	4.24E-02	4.44E-02	3.74E-02	2.89E-02	3.15E-02	3.41E-02	3.85E-02	3.65E-02	6.65E-03
		Individual Organic HAPs and VOCs											
x	z	2-Methylnaphthalene	1.06E-02	1.92E-02	1.78E-02	1.91E-02	1.59E-02	1.21E-02	1.28E-02	1.43E-02	1.60E-02	1.53E-02	3.09E-03
x	z	Naphthalene	9.66E-03	1.56E-02	1.39E-02	1.40E-02	1.20E-02	9.73E-03	1.10E-02	1.12E-02	1.28E-02	1.22E-02	2.03E-03
x		Phenol	1.04E-02	1.19E-02	1.03E-02	1.16E-02	1.04E-02	1.07E-02	1.10E-02	1.10E-02	1.04E-02	1.08E-02	5.73E-04
x	z	1-Methylnaphthalene	6.17E-03	9.65E-03	1.07E-02	1.13E-02	9.46E-03	7.15E-03	7.72E-03	8.56E-03	9.70E-03	8.93E-03	1.67E-03
x		Formaldehyde	2.80E-03	3.16E-03	2.82E-03	2.73E-03	1.19E-03	2.90E-03	3.26E-03	3.13E-03	3.21E-03	2.80E-03	6.36E-04
x		o-cresol	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA

ND: Non Detect; NA; Not Applicable

Core Storage 1.75% Binder

HAPs	POMs	Compound/Sample Number	EQ031	EQ032	EQ033	EQ034	EQ035	EQ036	EQ037	EQ038	EQ039	Average	STDEV
		Test Dates	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002	9/9/2002		
		TGOC as Propane	NA	NA	NA	I	NA	NA	NA	NA	NA	NA	NA
		HC as Hexane	5.97E-01	5.16E-01	6.31E-01	I	6.14E-01	7.39E-01	5.42E-01	5.58E-01	6.09E-01	6.01E-01	6.85E-02
		Sum of VOCs	3.02E-02	2.13E-02	3.03E-02	I	2.54E-02	3.15E-02	2.03E-02	2.38E-02	2.82E-02	2.64E-02	4.30E-03
		Sum of HAPs	3.02E-02	2.13E-02	3.03E-02	I	2.54E-02	3.15E-02	2.03E-02	2.38E-02	2.82E-02	2.64E-02	4.30E-03
		Sum of POMs	2.96E-02	2.07E-02	2.97E-02	I	2.51E-02	3.12E-02	1.98E-02	2.32E-02	2.75E-02	2.58E-02	4.33E-03
		Individual Organic HAPs and VOCs											
x	z	2-Methylnaphthalene	1.10E-02	7.47E-03	1.04E-02	I	8.94E-03	1.09E-02	7.38E-03	8.21E-03	1.04E-02	9.34E-03	1.52E-03
x	z	Naphthalene	1.01E-02	6.97E-03	1.00E-02	I	8.75E-03	1.09E-02	7.20E-03	8.50E-03	9.75E-03	9.02E-03	1.41E-03
x	z	1-Methylnaphthalene	8.43E-03	6.26E-03	9.30E-03	I	7.42E-03	9.42E-03	5.19E-03	6.45E-03	7.37E-03	7.48E-03	1.50E-03
x		Formaldehyde	6.12E-04	5.92E-04	6.45E-04	I	2.53E-04	2.88E-04	5.70E-04	5.87E-04	6.42E-04	5.24E-04	1.59E-04
x		o-cresol	ND	ND	ND	I	ND	ND	ND	ND	ND	NA	NA
x		Phenol	ND	ND	ND	I	ND	ND	ND	ND	ND	NA	NA

I: Data rejected based on data validation considerations.

ND: Non Detect; NA; Not Applicable

Individual Detection Levels for Test EQ

Test EQ Quantitation Limits - Lb/Tn Sand

Analytes	Core Mixing	Core Making	Core Storage
HC as hexane	2.30E-03	3.81E-03	2.32E-03
1-methylnaphthalene	2.30E-03	3.81E-03	2.32E-03
2-methylnaphthalene	2.30E-03	3.81E-03	2.32E-03
naphthalene	2.30E-03	3.81E-03	2.32E-03
o,m,p-cresol	3.00E-05	1.12E-03	5.69E-04
formaldehyde	1.24E-06	6.46E-05	9.32E-06
phenol	1.50E-05	9.30E-04	4.74E-04

Test EQ Quantitation Limits - Lb/Lb Binder

Analytes	Core Mixing	Core Making	Core Storage
HC as hexane	6.69E-05	1.09E-04	6.57E-05
1-methylnaphthalene	6.69E-05	1.09E-04	6.57E-05
2-methylnaphthalene	6.69E-05	1.09E-04	6.57E-05
naphthalene	6.69E-05	1.09E-04	6.57E-05
o,m,p-cresol	8.73E-07	3.19E-05	1.61E-05
formaldehyde	3.62E-08	1.85E-06	2.64E-07
phenol	4.37E-07	2.66E-05	1.34E-05

Detailed Process Data

Core Sand Mixing Test	1	2	3	4	5	6	7	8	9	10	11	12	13	Average All	Report Average
Date	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02		
Emission test No.	EQ001	EQ002	EQ003	EQ004	EQ005	EQ006	EQ007	EQ008	EQ009	EQ010	EQ011	EQ012	EQ013		
Total coated sand weight, Lbs.	51.4	50.9	50.9	**51.4**	**51.4**	**51.4**	**50.9**	**50.9**	**50.9**	**50.9**	**50.9**	**50.9**	50.9	51.0	**51.0**
Binder weight, Lbs.	0.876	0.875	0.874	**0.876**	**0.875**	**0.876**	**0.875**	**0.875**	**0.876**	**0.874**	**0.875**	**0.875**	0.874	0.875	**0.875**
Calculated % binder (BOS)	1.73	1.75	1.75	1.73	1.73	1.73	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.74	**1.74**
Calculated binder content,%	1.71	1.72	1.72	**1.71**	**1.70**	**1.71**	**1.72**	**1.72**	**1.72**	**1.72**	**1.72**	**1.72**	1.72	1.71	**1.71**
1800 F LOI, %	1.58	1.71	1.72	**1.62**	**1.54**	**1.65**	**1.58**	**1.56**	**1.64**	**1.64**	**ND**	**1.62**	1.60	1.62	**1.61**
Sand temperature, Deg F	84	83	84	**95**	**90**	**90**	**90**	**89**	**88**	**88**	**88**	**89**	90	88	**89.7**
													Note 2	Note 1	Note 1

Core Make Test	1	2	3	4	5	6	7	8	9	Average All	Report Average
Date	9/11/02	9/11/02	9/11/02	9/11/02	9/11/02	9/12/02	9/12/02	9/12/02	9/12/02		
Emission test No.	EQ021	EQ022	EQ023	EQ024	EQ025	EQ026	EQ027	EQ028	EQ029		
Total coated sand weight, Lbs.	212.8	210.9	213.3	200.6	197.4	212.2	212.8	213.7	215.8	209.9	**209.9**
Calculated Total Binder weight, Lbs.	3.71	3.68	3.74	3.51	3.46	3.69	3.70	3.74	3.78	3.7	**3.67**
Calculated % Binder (BOS)	1.745	1.747	1.754	1.750	1.754	1.741	1.738	1.750	1.750	1.748	**1.748**
1800 F LOI, %	1.62	1.60	1.60	1.58	1.56	1.58	1.53	1.56	1.55	1.58	**1.58**
Sand temperature, Deg F	87.4	86.8	87	89	87	87.2	89.2	90.8	89.2	88.5	**88.5**
TEA Injection/cycle, gm/cycle	3.90	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.50	**3.50**
Blow pressure, psi	30	30	30	30	30	30	30	30	30	30.0	**30.0**
Max. Purge Pressure, psi	45	45	45	45	45	45	45	45	45	45.0	**45.0**
Purge duration, sec	20	20	20	20	20	20	20	20	20	20.0	**20.0**
Machine cycles per test	30	30	30	31	29	30	30	30	30	30.0	**30.0**
Ave.core machine cycle time, sec.	65.3	75.7	71.0	95.6	82.6	69.8	66.9	64.6	63.2	72.7	**72.7**
										Note 1	Note 1

Core Storage Test	1	1	1	1	2	2	2	2	3	3	3	3	Average All	Report Average
Date	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02	9/9/02		
Emission test No.	THC1	EQ031	EQ032	EQ033	THC2	EQ034	EQ035	EQ036	THC-3	EQ037	EQ038	EQ039		
Total coated sand weight, Lbs.	7.25	**7.20**	**7.20**	**7.15**	7.25	**7.25**	**7.25**	**7.20**	7.30	**7.30**	**7.25**	**7.25**	7.2	**7.2**
Calculated total binder weight, Lbs.	0.127	**0.126**	**0.126**	**0.125**	0.128	**0.128**	**0.128**	**0.127**	0.128	**0.128**	**0.127**	**0.127**	0.127	**0.127**
Calculated % binder (BOS)	1.748	**1.748**	**1.748**	**1.748**	1.766	**1.766**	**1.766**	**1.766**	1.748	**1.748**	**1.748**	**1.748**	1.754	**1.754**
1800 F LOI, %	ND	**ND**	**ND**	**ND**	1.54	**1.54**	**1.54**	**1.54**	1.57	**1.57**	**1.57**	**1.57**	1.56	**1.56**
Average core weight, Lbs.	7.25	**7.20**	**7.20**	**7.15**	7.25	**7.25**	**7.25**	**7.20**	7.30	**7.30**	**7.25**	**7.25**	7.24	**7.24**
Sand temperature, Deg F	88	**88**	**88**	**88**	85	**85**	**85**	**85**	90	**90**	**90**	**90**	87.6	**87.6**
TEA Injection/cycle, gm/cycle	3.9	**3.9**	**3.9**	**3.9**	3.45	**3.45**	**3.45**	**3.45**	–	--	–	--	3.7	**3.7**
Blow pressure, psi	30	**30**	**30**	**30**	30	**30**	**30**	**30**	30	**30**	**30**	**30**	30	**30**
Max purge pressure, psi	45	**45**	**45**	**45**	45	**45**	**45**	**45**	45	**45**	**45**	**45**	45.0	**45.0**
Purge duration, sec	20	**20**	**20**	**20**	20	**20**	**20**	**20**	20	**20**	**20**	**20**	20.0	**20.0**
Ave.core machine cycle time, sec.	81.0	**61.0**	**61.0**	**58.0**	--	**61.0**	**59.0**	**64.0**	–	**62.0**	**85.0**	**84.0**	67.6	**67.6**
													Note 1	Note 1

Note 1: Report Averages included only validated test for which emission data are used in reporting a result

Average All included all tests even thought they may have been invalidated for a process or emission data reason

Note2: Mix test 13 was stopped prematurely. It will not be used.

APPENDIX C METHOD 25A CHARTS

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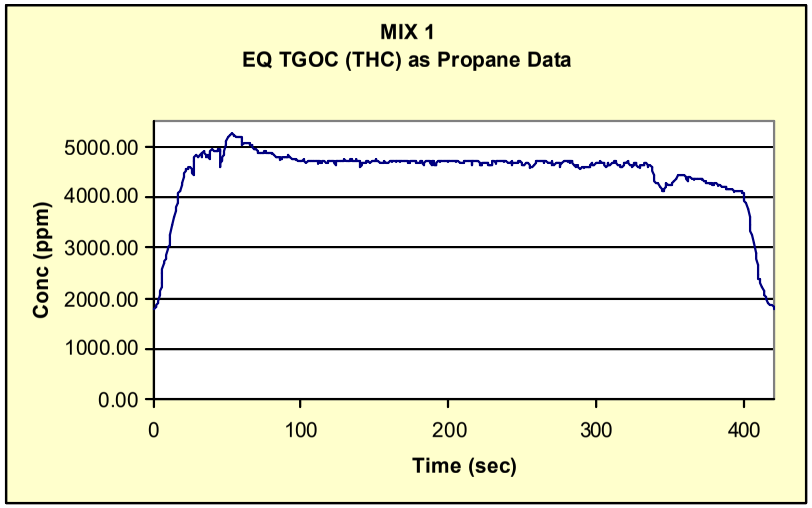
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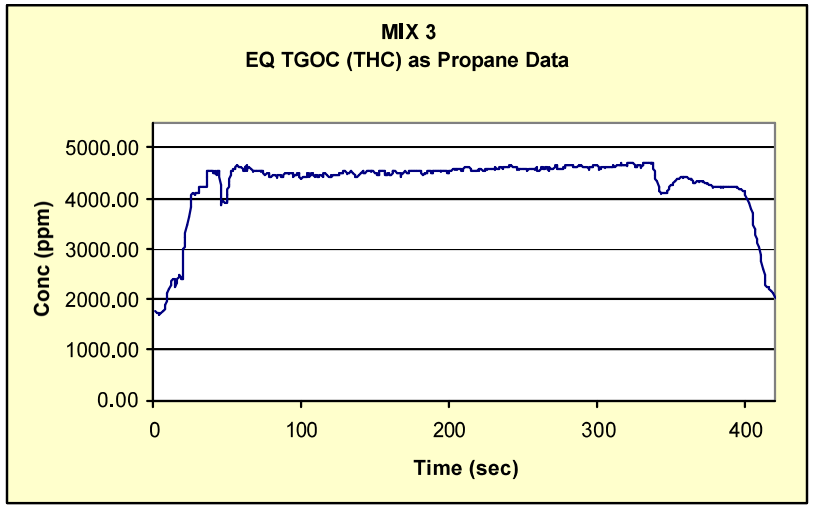
300
400
Time (sec)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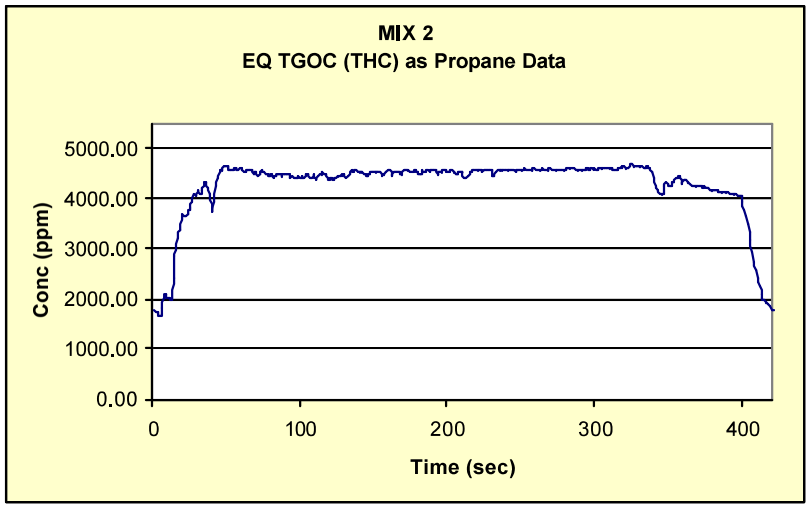
300
400
Time (sec)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EQ TGOC (THC) as Propane Data
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1000.00
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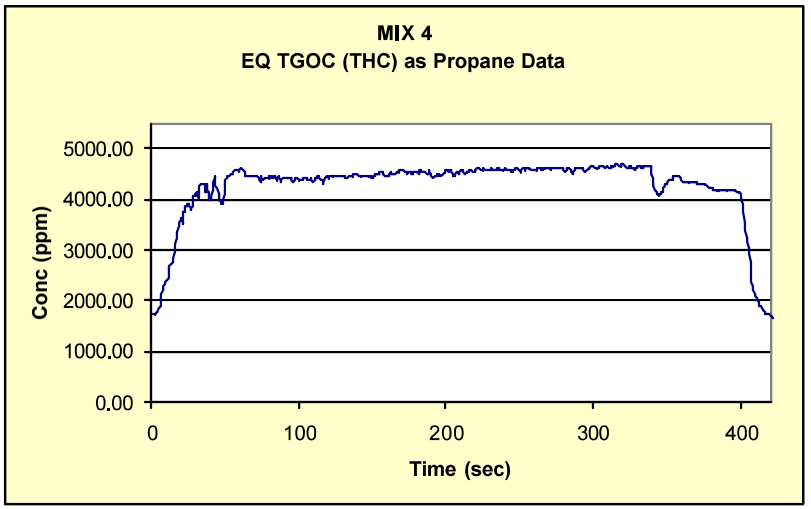
200
300
400
Time (sec)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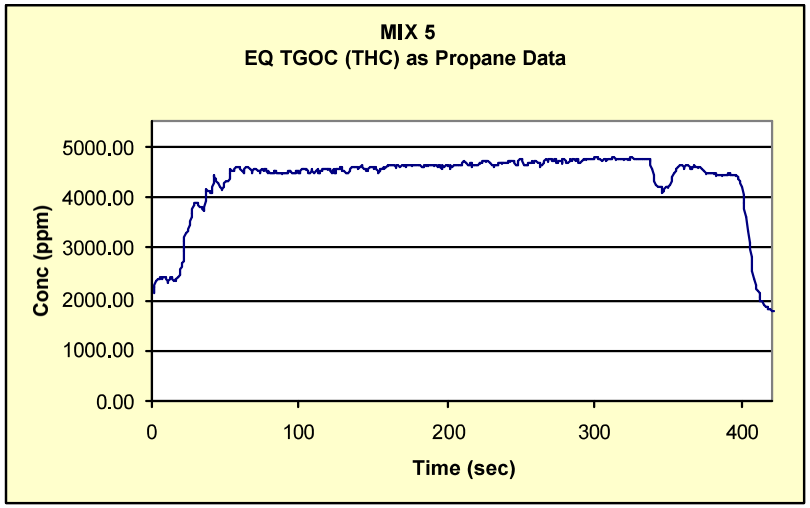
100
200
300
400
Time (sec)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Conc (ppm)
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1000.00
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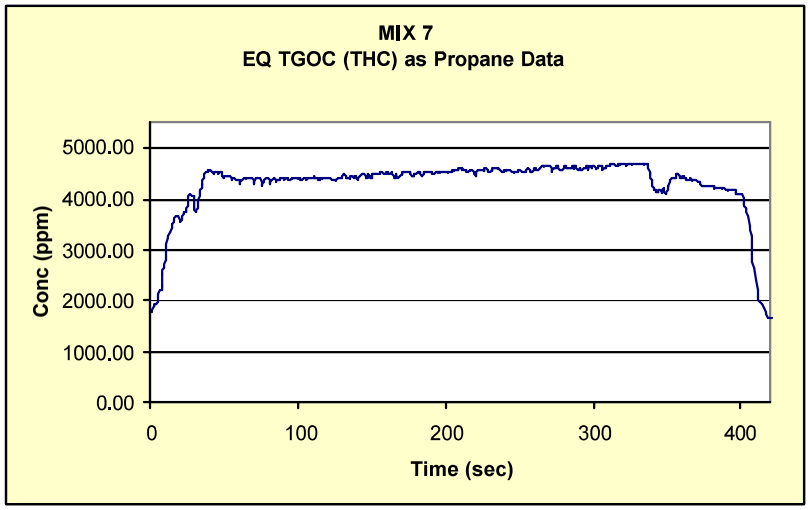
100
200
300
400
Time (sec)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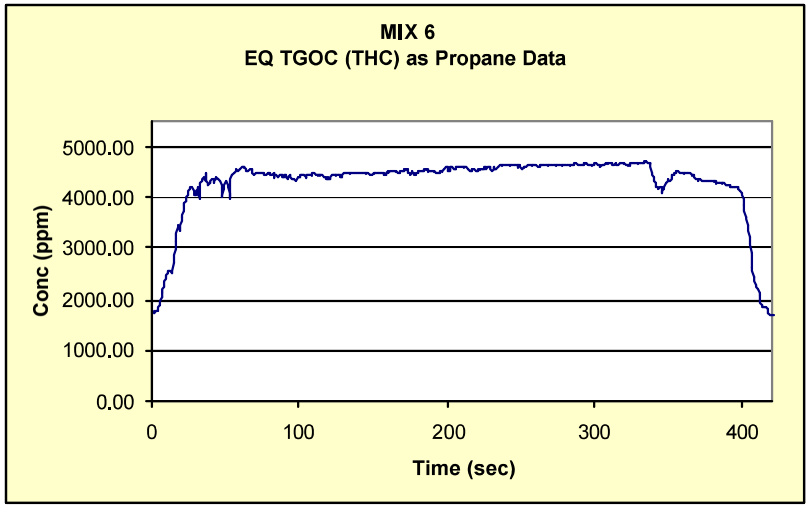
100
200
300
400
Time (sec)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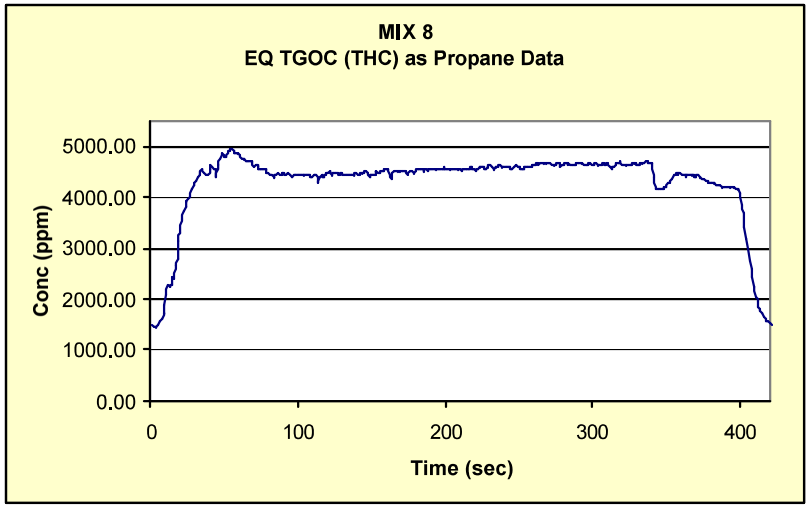
200
300
400
Time (sec)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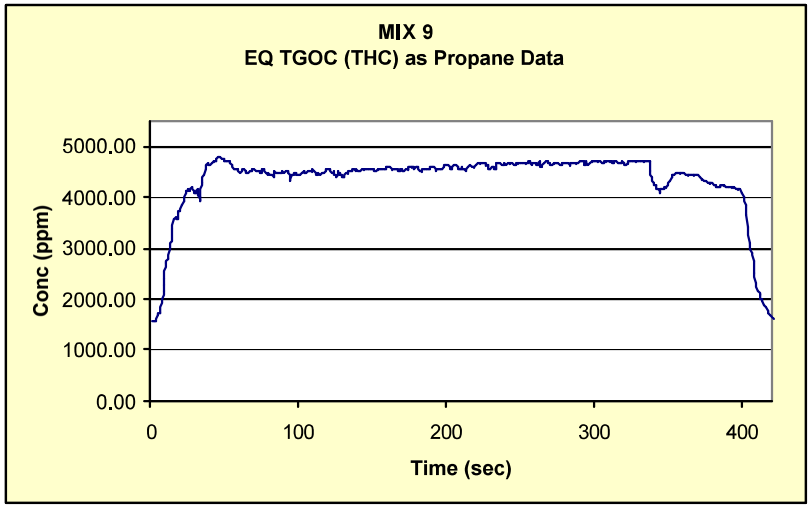
0
100
200
300
400
Time (sec)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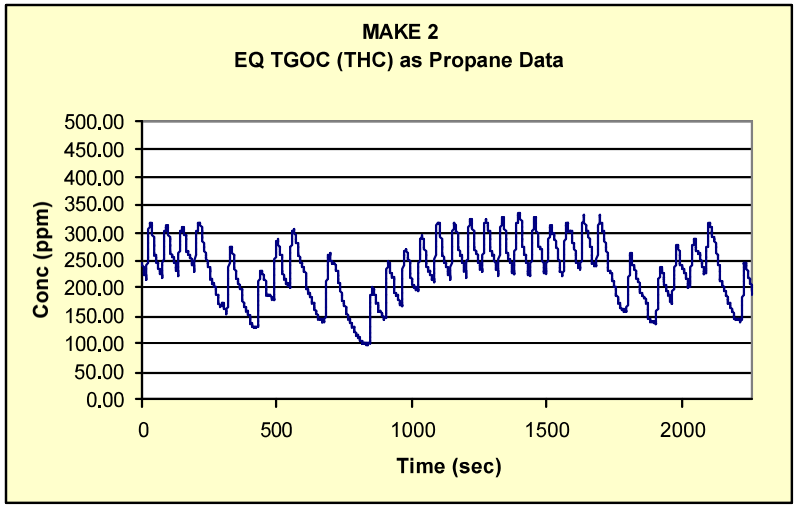
200
300
400
Time (sec)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EQ TGOC (THC) as Propane Data
Conc (ppm)
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400.00
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300.00
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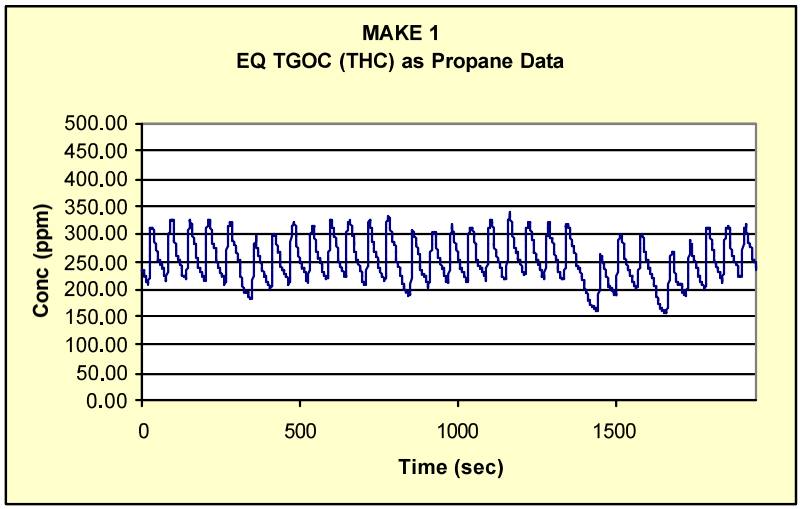
200.00
150.00
100.00
50.00
0.00
0
500
1000
1500
2000
Time (sec)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Conc (ppm)
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400.00
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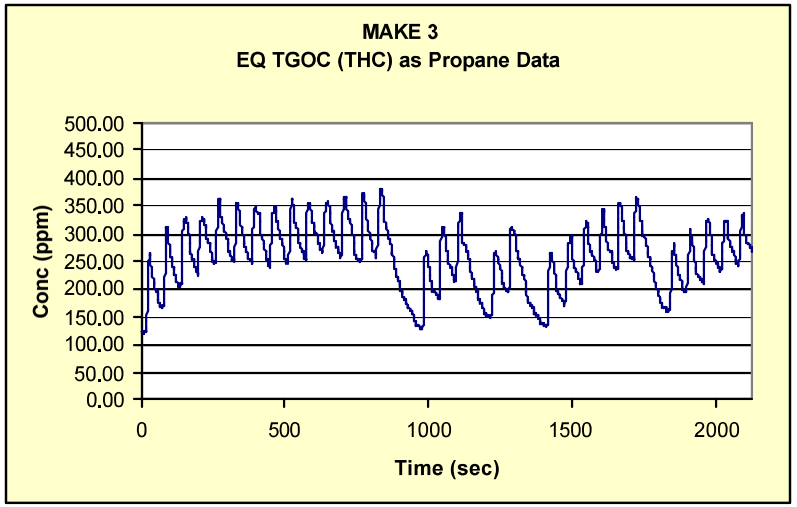
250.00
200.00
150.00
100.00
50.00
0.00
0
500
1000
1500
Time (sec)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0.00
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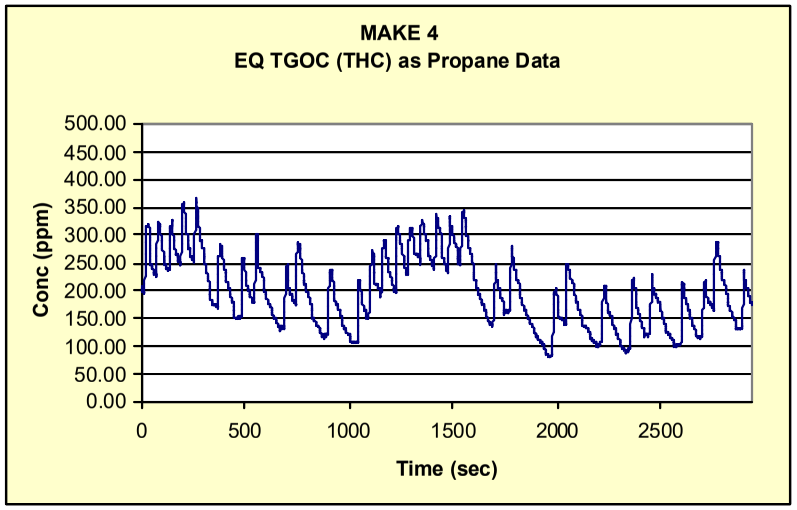
1000
1500
2000
Time (sec)


MAKE 4
EQ TGOC (THC) as Propane Data
Conc (ppm)
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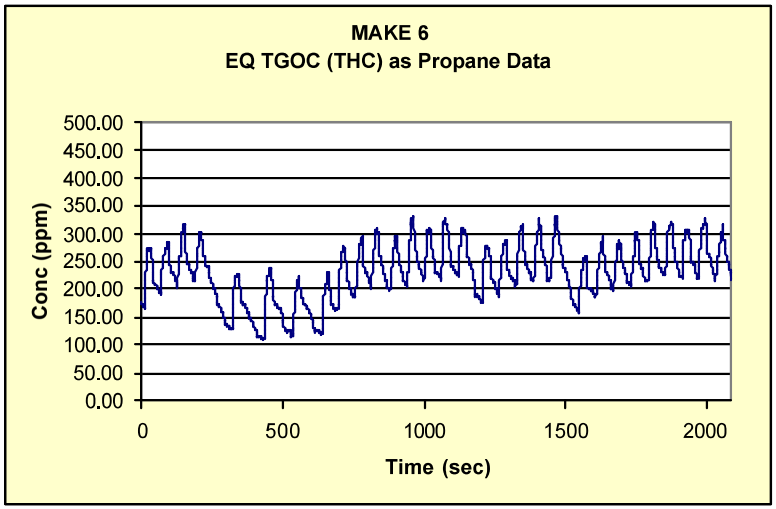
50.00
0.00
0
500
1000
1500
2000
2500
Time (sec)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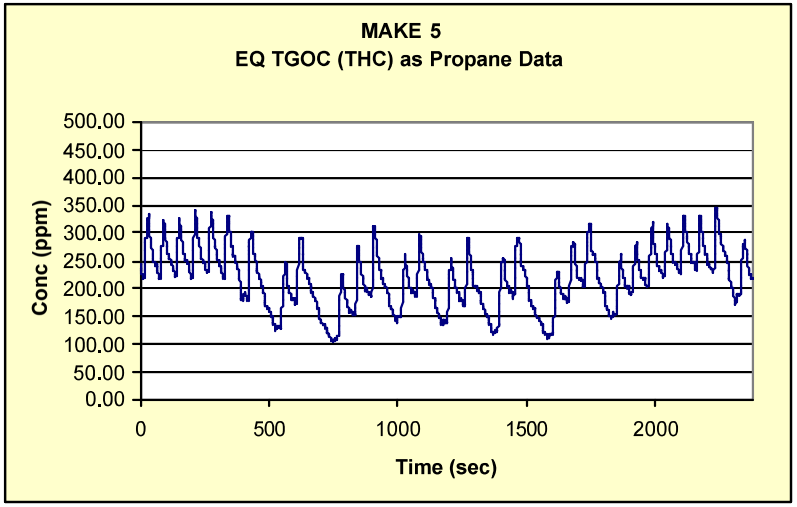
50.00
0.00
0
500
1000
1500
2000
Time (sec)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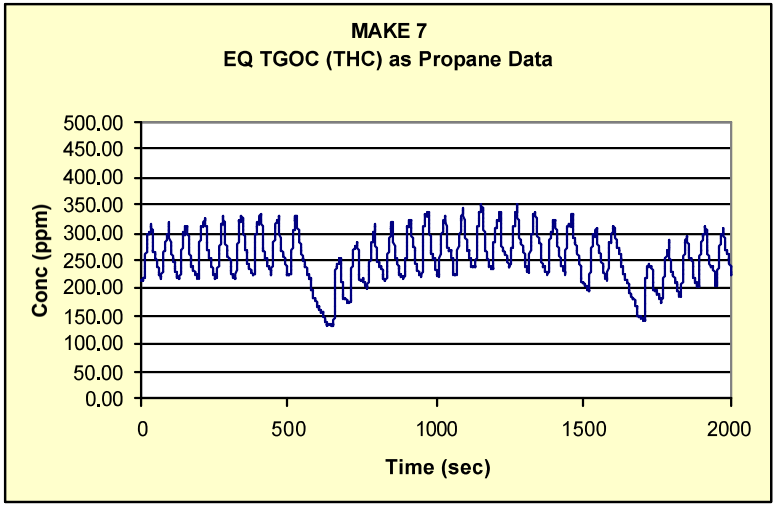
500
1000
1500
2000
Time (sec)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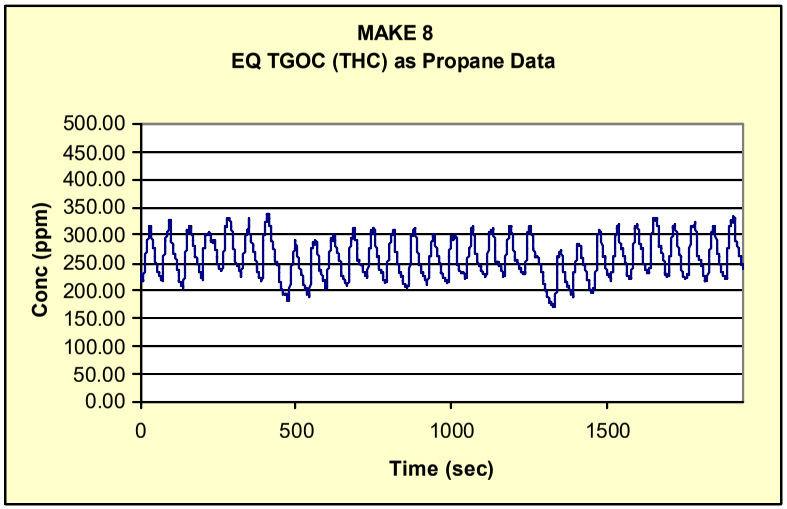
1000
1500
2000
Time (sec)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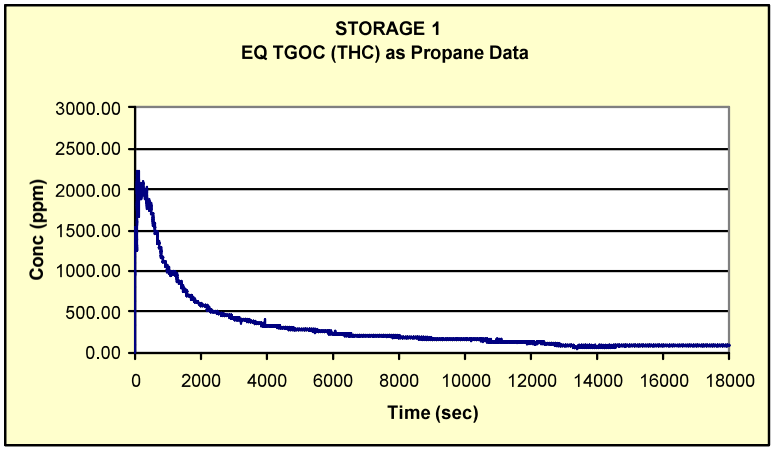
500
1000
1500
Time (sec)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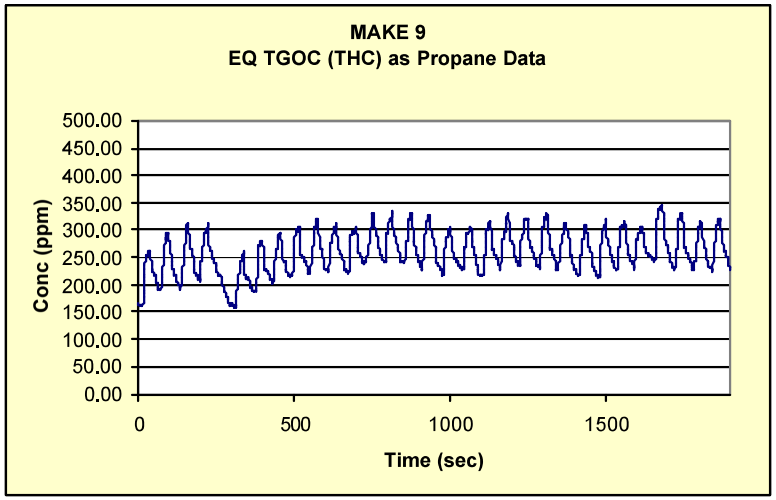
4000
6000
8000
10000
12000
14000
16000
18000
Time (sec)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EQ TGOC (THC) as Propane Data
Conc (ppm)
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50.00
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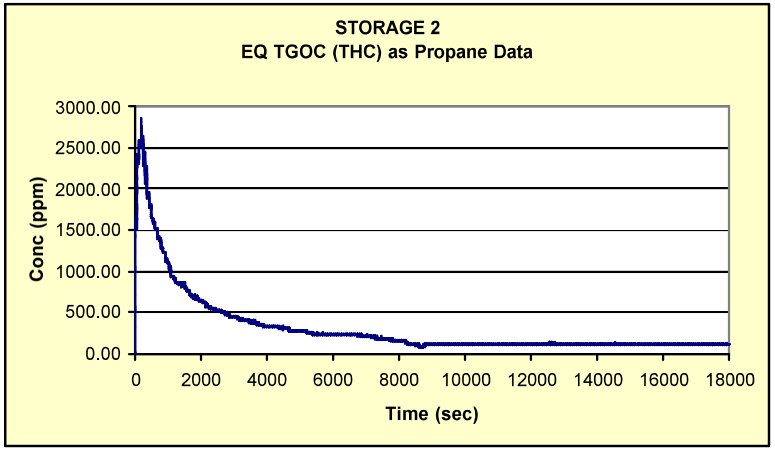
0
500
1000
1500
Time (sec)


STORAGE 2
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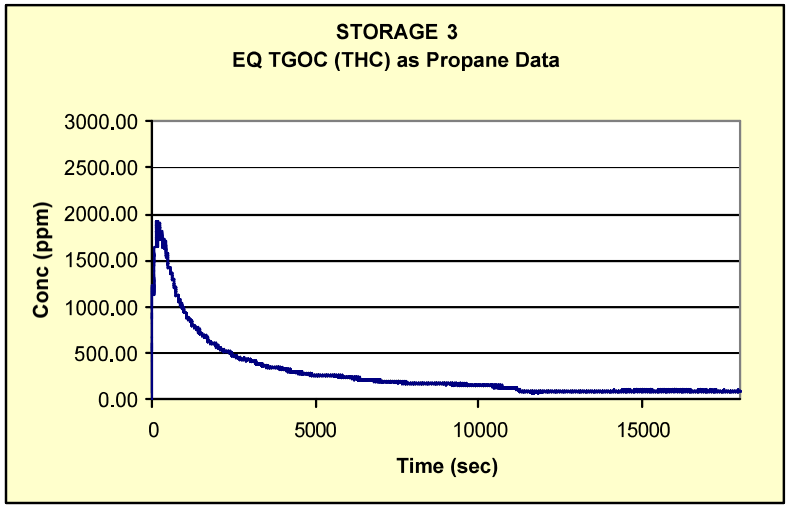
Time (sec)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500.00
0.00
Conc (ppm)
0
5000
10000
15000
Time (sec)

APPENDIX D GLOSSARY

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ND	Non Detect
NA	Not Applicable
HC as Hexane	Calculated by the summation of all area between elution of Hexane through the elution of Hexadecane. The quantity of HC is performed against a five-point calibration curve of Hexane by dividing the total area count from C6 through C16 to the area of Hexane from the initial calibration curve.
BOS	Based on Sand
Binder	Part 1 plus Part II

Pre-Production Test (DQ)
Test Plan #RE100112DQ

WBS # 1.3.1.1

20/80 Western/Southern Bentonite Clay Ratios

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Casting Emission Reduction Program

Prepared by:

TECHNIKON LLC

5301 Price Avenue ? McClellan, CA, 95652 ? (916) 929-8001

www.technikonllc.com

US Army Task N256

Pre-Production Air Emission Test Report

20/80 Western/Southern Bentonite Clay Ratios

Technikon #RE100114 DQ

25 April 2001

EPA United States Environmental Protection Agency

CISA

AFS AMERICAN FOUNDRY SOCIETY, INC.

USCAR UNITED STATES COUNCIL FOR AUTOMOTIVE RESEARCH

DAIMLERCHRYSLER Ford Motor Company General Motors

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Pre-production Air Emission Tests

20/80 Western/Southern
Bentonite Clay Ratios

CERP Test Plan #RE100112DQ

This report has been reviewed for completeness and accuracy and approved for release by the following:

Written By:	Scott Forbes	4/25/01
	Scott Forbes	Date
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	Steven Knight	Date
VP Measurement Technologies:	Clifford Glowacki, CIH	4-25-01
	Clifford Glowacki, CIH	Date
VP Operations:	George Crandell	4-25-01
	George Crandell	Date
President:	William Walden	4/25/01
	William Walden	Date

The data contained in this report were developed to assess the relative emissions profile of the product or process being evaluated against a standardized baseline process profile. You may not obtain the same results in your facility. Data was not collected to assess casting quality, cost, or producibility

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Executive Summary

This report contains the results of testing conducted at the Technikon/CERP Pre-Production Foundry to establish a tap water reference against which the effects of advanced oxidant (AO) enriched water on the emissions from vented cored greensand molds may be investigated. Casting surface quality was not evaluated during these tests. This report provides results from a total of nine test plans (tests), with the first three tests performed to condition virgin sand and mold materials. Results are presented for all nine tests, and separately for the six post-conditioning tests. The approved test plan for this test series may be found in Appendix A of this document. Points of comparison between this and related AO studies have been **bolded**.

This report contains the results of emission testing at the Casting Emission Reduction Program (CERP) Pre-Production Foundry operated by Technikon LLC. The specific objective of Test Plan DQ was to determine the emission reductions, if any, of organic Hazardous Air Pollutants (HAPs) and Volatile Organic Compounds (VOCs) for a vented **tap water** tempered virgin greensand mold utilizing a **20/80** Western to Southern bentonite clay ratio and Seacoal. The core package consisted of organic free sodium silicate cores so that the only known mold organic was Seacoal. The test results may be compared to Pre-Production Tests DR, and DT that also utilize a vented **tap water** tempered virgin greensand mold with Seacoal, and bentonite clay ratios of **50/50** and **80/20** Western to Southern respectively. In addition, test results may be compared to Pre-Production Tests DA, DS, and DU that are duplicates of DQ, DR, and DT, except that they utilize **advanced oxidation (AO) treated water** additions instead of tap water.

The Pre-production Foundry is a simple general purpose manual foundry that was adapted and instrumented to make detailed organic emission measurements, using methods based on EPA protocols for pouring, casting cooling, and shakeout processes on discrete mold and core packages. The measurements are conducted under tightly controlled conditions not feasible in a commercial foundry. It is the initial step in the schema of evaluating a new product or process for the foundry industry. The results of testing in the Pre-production Foundry are evaluated to determine whether further testing in the Technikon Production Foundry is warranted.

The testing performed involved the collection of continuous air samples over a seventy-five minute period, including the mold pouring, cooling, shakeout, and post shakeout periods. Process and stack parameters were measured and include: the weights of the casting, mold, core binder, and core; Loss on Ignition (LOI) values for the mold prior to the test and at shakeout; percent clays; metallurgical data; and stack temperature, pressure, volumetric flow rate and moisture content. The process parameters were maintained within prescribed ranges in order to ensure the reproducibility of the tests. Nine (9) individual sampling events were conducted for test plan DQ. Three tests were utilized to condition the sand to the tap water, based on historical data, and six tests were utilized for the actual test.

Samples were collected and analyzed for a limited list of twenty (20) target compounds using procedures based on US EPA Method 18. Continuous monitoring of the Total Gaseous Organic Concentration (TGOC), formerly Total Hydrocarbon Content (THC), of the emissions was conducted according to US EPA Method 25A. Finally, the "condensable" organic material in the

emissions was determined using a Technikon developed procedure. The "condensables" represent the "back half" catch from US EPA Method 5.

The mass emission rate of each parameter or target compound was calculated, in pounds per ton of metal, using the Method 25A data or the laboratory analytical results, the measured source data, and the weight of each casting. Results for structural isomers have been grouped and reported as a single entity. For example, ortho-, meta-, and para-xylene are the three (3) structural isomers of dimethyl benzene. Several "emissions indicators," in addition to the TGOC (THC) as Propane, were also calculated. The HC as Hexane results represent the sum of all organic compounds detected and expressed as Hexane. All of the following sums are sub-groups of this measure. The "Sum of VOCs" is based on the sum of the individual target VOCs measured and includes the HAPs and Polycyclic Organic Material (POMs) listed in the Clean Air Act Amendments of 1990. The "Sum of HAPs" is the sum of the individual target HAPs measured and includes the POMs. Finally, the "Sum of POMs" is the sum of all of the polycyclic organic material measured. Results for the emission indicators, for all nine-test runs, and for the six post-conditioning test runs, are shown in the following table. All results are measured as pounds emitted per ton of metal.

Number of Tests Included	**TGOC (THC) As Propane**	**HC as Hexane**	**Sum of VOCs**	**Sum of HAPs**	Sum of POMs
6	2.136	0.6072	0.2093	0.1881	ND
9	2.459	0.6435	0.2356	0.2127	ND

Due to the fact that the results expressed here are sums derived from a set of approximately 20 analytes, they are comparable only to test series utilizing an equivalent analyte list. All test series performed for the AO water/Tap water, clay ratio studies will utilize this analyte list, and are therefore comparable. But they cannot be compared to similarly titled results from test series in which an analytes list of greater than 70 compounds have been used to generate the data.

In addition, it must be noted that the reference and product testing performed is not suitable for use as general emission factors or for purposes other than evaluating the relative emission reductions associated with the use of alternative materials, equipment, or processes. The emissions measurements are unique to the specific castings produced, materials used, and testing methodology associated with these tests, and should not be used as the basis for estimating emissions from actual commercial foundry applications.

1.0 Introduction

1.1 Background

Technikon LLC is a privately held contract research organization located in McClellan, California, a suburb of Sacramento. Technikon offers emissions and process research services to industrial and government clients specializing in the metal casting and mobile emissions areas. Technikon also operates the Casting Emission Reduction Program (CERP). CERP is a cooperative initiative between the Department of Defense (US Army) and the United States Council for Automotive Research (USCAR). Its purpose is to evaluate alternative casting materials and processes that are designed to reduce air emissions and/or produce more efficient casting processes. Other technical partners directly supporting the project include: the American Foundry Society (AFS); the Casting Industry Suppliers Association (CISA); the US Environmental Protection Agency (USEPA); and the California Air Resources Board (CARB). Each of these partners is represented on a Steering Committee (as voting or non-voting members) that has oversight for the CRADA testing conducted at the Technikon facility.

1.2 CERP Objectives

The primary objective of CERP program is to evaluate materials, equipment, and processes used in the production of metal castings. The Technikon facility was designed to evaluate alternate materials and production processes designed to achieve significant air emission reductions, especially for the 1990 Clean Air Act Amendment organic Hazardous Air Pollutants (HAP). The facility has two principal testing arenas: a Pre-production Foundry designed to measure airborne emissions from individually poured molds, and a Production Foundry designed to measure air emissions in a continuous full scale production process. Each of these testing arenas has been specially designed to facilitate the collection and evaluation of airborne emissions and associated process data. The data collected during the various testing projects are evaluated to determine both the airborne emissions impact of the materials and/or process changes, and their stability and impact upon the quality and economics of casting and core manufacture. The materials, equipment, and processes may need to be further adapted and defined so that they will integrate into current casting facilities smoothly and with minimum capital expenditure.

Normally, Pre-production testing is conducted first in order to evaluate the air emissions impact of a proposed alternative material, equipment, or process in the most cost effective manner. The Pre-production Foundry is a simple general purpose manual foundry that was adapted and instrumented to make detailed emission measurements using methods based on EPA protocols for pouring, casting cooling, and shakeout processes on discrete mold and core packages under tightly controlled conditions not feasible in a commercial foundry. The Pre-production Foundry uses an eight-cavity, bottom feed AFS step block as its test mold pattern.

The Production Foundry's design as a basic greensand foundry was deliberately chosen so that whatever is tested in this facility will also be convertible to existing mechanized commercial foundries. The type and size of equipment, materials, and processes used emulate an automotive foundry. This facility is used to evaluate materials, equipment, and processes in a continuous process that is allowed to vary to the limits of commercial experience in a controlled manner.

The Production Foundry provides simultaneous detailed individual emission measurements using methods based on USEPA protocols of the melting, pouring, sand preparation, mold making, and core making processes. It is instrumented so that the data on all activities of the metal casting process can be simultaneously and continuously collected, in order to completely evaluate the economic impact of the prospective emission reducing strategy. The Production Foundry's test casting is a single cavity Ford Motor Company I-4 engine block. Castings are randomly selected to evaluate the impact of the material, equipment, or process on casting quality. Alternative materials, equipment, and processes that demonstrate significant air emission reduction potential, preserve casting quality parameters, and that are economically viable based on the Pre-production testing, may be further evaluated in the Production Foundry.

It must be noted that the results from the reference and product testing performed are not suitable for use as general emission factors or for other purposes other than evaluating the relative emission reductions associated with the use of alternative materials, equipment, or manufacturing processes. The emissions measurements are unique to the specific castings produced, materials used, and testing methodology associated with these tests.

1.3 Report Organization

This report has been designed to document the methodology and results of a specific test plan that was used to evaluate the performance of an alternative material, equipment, or process in the Pre-production Foundry. Section 2 of this report includes a summary of the methodologies used for data collection and analysis, emission calculations, QA/QC procedures, and data management and reduction methods. Specific data collected in support of these tests are summarized in Section 3 of this report, with detailed data included in Appendices B and C of this report. Section 4 of this report contains a discussion of the results along with conclusions and recommendations.

The raw data for this test series are included in a data binder that is maintained at the Technikon facility. There are several support documents that provide details regarding the testing and analytical procedures used. Appendix F contains a listing of these support documents.

1.4 Preliminary Testing

The foundation for the specific test protocols and airborne emission measurements have been determined from testing performed to:

?? Establish the required number of samples needed to statistically support the evaluation of emission reduction potentials of the alternative materials, equipment, and processes that may be evaluated;

?? Provide a series of standardized emissions from standard mold and core packages.

It has been determined that nine replicate tests will provide a statistically significant sample for the purposes of evaluating the emission reductions from alternative materials, equipment, and processes. The results of the testing conducted in support of this conclusion is included in a report entitled Evaluation of the Required Number of Replicate Tests to Provide Statistically

Significant Air Emission Reduction Comparisons for the CERP Pre-production Foundry Test Program.

Appendix A of this report contains the Test Plan for Test Series DQ.

Appendix B of this report contains detailed test results for Test Series DQ.

1.5 Specific Test Plan and Objectives

This report contains the results of testing performed to assess the emission reductions, if any, of organic Hazardous Air Pollutants (HAPs) and Volatile Organic Compounds (VOCs) for a tap water treated virgin greensand mold utilizing a 20/80 Western to Southern bentonite clay ratio and Seacoal. The core package consists of organic free sodium silicate cores so that the only known mold organic is Seacoal.

The results from test DQ will provide comparative data to Pre-production Tests DR and DT, which are also tap water tempered greensand molds with Seacoal, but with bentonite clay ratios of 50:50 and 80:20 Western to Southern, respectively. Test DQ will also provide a tap water reference for comparison to three additional Test Series, DA, DS, and DU, where advanced oxidation (AO) treated water additions were substituted for tap water in molds containing each of the three clay ratios listed above.

Table 1-1 provides a summary of the Test Plan. The detail of the approved test plan is included in Appendix A.

Table 1–1 Test Plan Summary

	Test Plan
Type of Process tested	20/80 Western to Southern Clays w/ Tap Water
Test Plan Number	RE 1 00112 DQ
Mold Type	Hand Rammed Greensand
Core Type	Organic Free Sodium Silicate
Casting Type	Eight-cavity bottom feed AFS step block
Baseline Comparison	Greensand
Number of molds poured	6 (9 including conditioning runs)
Test Dates	12/13/00, 12/14/00, 12/18/00
Emissions Measured	20 organic HAPs and VOCs
Process Parameters Measured	Total Casting, Mold and Core Weights, Metallurgical data, Mold and Core Component Weights, % LOI (mold and core), % Clay, Stack Temperature, Stack Moisture Content, Stack Pressure, and Stack Volumetric Flow Rate

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2.0 Test Methodology

2.1 Description of Process and Testing Equipment

The following figure is a diagram of the Pre-production Foundry process equipment.

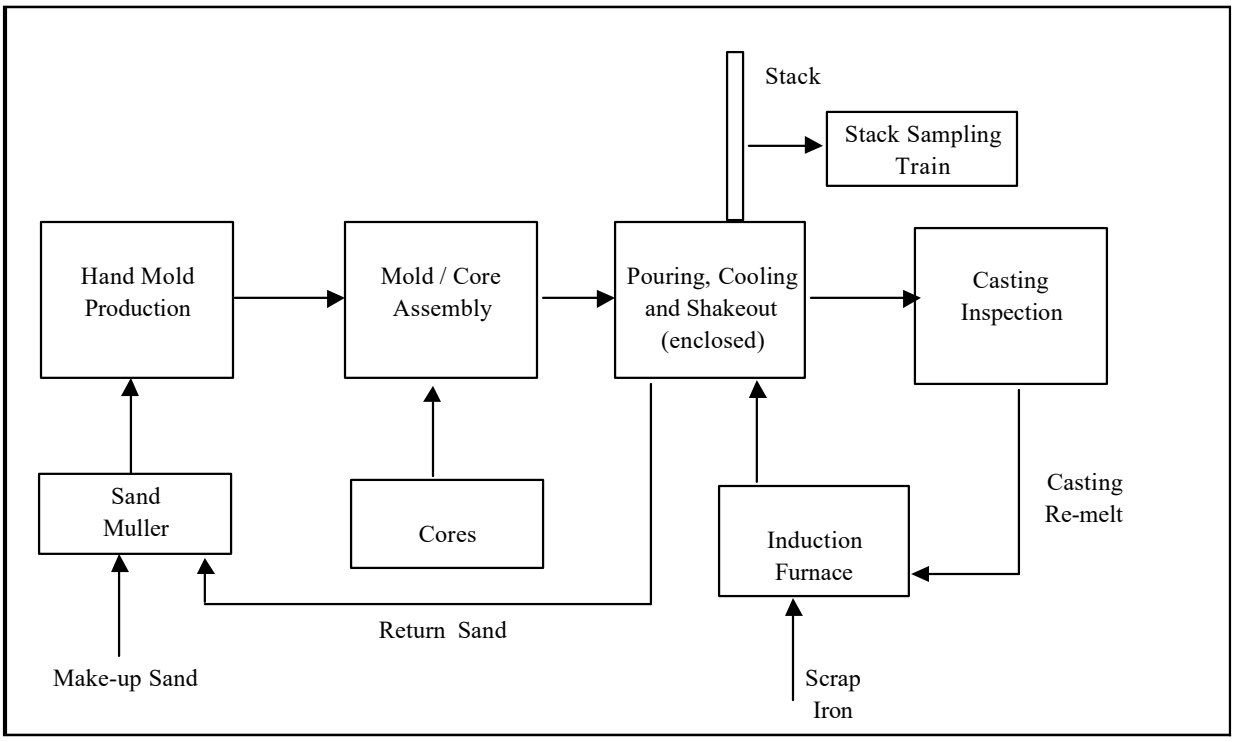

Figure 2-1 Pre-production Foundry Layout Diagram

2.2 Description of Testing Program

The specific steps used in this sampling program are summarized below:

1. **Test Plan Review and Approval:** The proposed test plan was reviewed by the Technikon staff and CTC Program Manager, and approved.

2. **Mold, Core and Metal Preparation:** The molds and cores are prepared to a standard composition by the CERP production team. The cores are made either by hand (if sodium silicate) or blown by a Redford core blower, and relevant process data are collected. If new core processes are being tested, the cores are placed in new lake sand/clay/water molds. If new mold binder systems or processes are being evaluated, organic free sodium silicate step cores are placed into the molds. Iron is melted in a 1000 lb. Ajax induction furnace (Model MFB-1000). The amount of metal melted is determined from the poured weight of the casting and the number of molds to be poured. The metal composition is prescribed by a

metal composition worksheet. The weight of metal poured into each mold is recorded on the process data summary sheet.

Setting of Step Cores in Mold

3. **Individual Sampling Events:** Replicate tests are performed on nine mold/core packages. The mold/core packages are placed into an enclosed test stand. Iron is poured through an opening in the top of the enclosure. The opening is closed as soon as pouring is completed. Continuous air samples are collected during the forty-five minute pouring and cooling process, during the fifteen minute shakeout of the mold, and for an additional fifteen minute period following shakeout. The total sampling time is seventy-five minutes.

Pouring of Step Core Molds Through Opening in Collection Hood

The finished castings are cleaned and quality checks of the castings are performed. Additional tests may be required for new mold materials with the molding sand being recycled into new molds to evaluate the long-term effects on molding sand properties.

The weights of the molds, cores, Seacoal additions, and binder are recorded for each mold on the Process Data Summary Sheet. In addition, the pouring temperature, number of cavities poured, the %LOI and the % clays of the mold before pouring and at shakeout, and the % LOI of the core are recorded on the Process Data Summary Sheet.

The unheated emission hood is ventilated at approximately 700 SCFM through a 12-inch diameter heated duct. Emissions samples are drawn from a sampling port located to ensure conformance with EPA Method 1. The tip of the probe is located in the centroid of the duct. The samples are collected at a constant rate in adsorption tubes (test sample and duplicate sample).

Castings on the Shake Out Deck

4. **Process Parameter Measurements:** Table 2-1 lists the process parameters that are monitored during each test. The analytical equipment and methods used are also listed.

Table 2-1 Process Parameters Measured

Parameter	Analytical Equipment and Methods
Core Weight	Mettler PJ8000 Digital Scale (Gravimetric)
Mold Weight	Acme 4260 Crane Scale (Gravimetric)
Casting Weight	Westweigh PP2847 Platform Scale (Gravimetric)
Seacoal Weight	Toledo PAC-DPC-606050 balance (Gravimetric)
Binder Weight	Mettler PJ8000 Digital Scale (Gravimetric)
Volatiles	Mettler Pb302 Scale (AFS procedure 212-87-S)
LOI, % at mold and shakeout	Denver Instruments XE-100 Analytical Scale (AFS procedure 212-87-S)
Core LOI, %	Denver Instruments XE-100 Analytical Scale (AFS procedure 321-87-S)
Clay, % at mold and shakeout	Dietert 535A MB Clay Tester (AFS Procedure 210-89-S)
Metallurgical Parameters	
Pouring Temperature	Electro-Nite DT 260 (T/C immersion pyrometer)
Carbon/Silicon Fusion Temperature	Electro-Nite Datacast 2000 (Thermal Arrest)
Alloy Weights	Ohaus MP@
Mold Compactability	Dietert 319A Sand Squeezer (AFS procedure 221-87-S)
Carbon/Silicon	Baird Foundry Mate Optical Emissions Spectrometer

5. **Emissions Measurement:** The specific sampling and analytical methods used in the Pre-production Foundry tests are based on the USEPA reference methods shown in Table 2-2. The details of the specific testing procedures and their variance from the reference methods are included in the Emissions Testing and Analytical Testing Standard Operating Procedures.

Table 2-2 Sampling and Analytical Methods

Measurement Parameter	Test Method
Port location	EPA Method 1
Number of traverse points	EPA Method 1
Gas velocity and temperature	EPA Method 2
Gas density and molecular weight	EPA Method 3a
Gas moisture	EPA Method 4, gravimetric
HAPs concentration	EPA Method 18, TO11, NIOSH 2002*
VOCs analysis	EPA Method 18, 25A, TO11, NIOSH 2002*
Condensables	Technikon developed method**

*These methods were specifically modified to meet the testing objectives of the CERP Program.
**The Technikon condensables method is intended to provide a measure of the EPA Method 5 "back-half" determination.

6. **Data Reduction, Tabulation and Preliminary Report Preparation:** The analytical results of the emissions tests provide the mass of each analyte in the sample. The total mass of the analyte emitted is calculated by multiplying the mass of analyte in the sample times the ratio of total stack gas volume to sample volume. The total stack gas volume is calculated from the measured stack gas velocity and duct diameter, and corrected to dry standard conditions using the measured stack pressures, temperatures, gas molecular weight, and moisture content. The total mass of analyte is then divided by the weight of the casting poured to provide emissions data in pounds of analyte per ton of metal.

   The results for each sampling event are included in Appendix B of this report. The results for each test are also averaged and are shown in Table 3-1.

7. **Report Preparation and Review:** The Preliminary Draft Report is reviewed by the Process Team and Emissions Team to ensure its completeness, consistency with the test plan, and adherence to the prescribed QA/QC procedures. Appropriate observations, conclusions and recommendations are added to the report to produce a Draft Report. The Draft Report is reviewed by the Vice President-Measurement Technologies, the Vice President-Operations, and the Technikon President. Comments are incorporated into a Final Report that is circulated for signatures and then distributed.

2.3 Quality Assurance and Quality Control (QA/QC) Procedures

Detailed QA/QC and data validation procedures for the process parameters, stack measurements, and laboratory analytical procedures are included in the CERP Standard Operating Procedures. In order to ensure the timely review of critical quality control parameters, the following procedures are followed:

- Immediately following the individual sampling events performed for each test, specific process parameters are reviewed by the Manager - Process Engineering to ensure that the parameters are maintained within the prescribed control ranges. Where data are not within the prescribed ranges, the Manager - Process Engineering and the Vice President-Operations determine whether the individual test samples should be invalidated or flagged for further analysis following review of the laboratory data.

- The source (stack) and sampling parameters, analytical results and corresponding laboratory QA/QC data are reviewed by the Emissions Measurement Team to confirm the validity of the data. The VP-Measurement Technologies reviews and approves the recommendation, if any, that individual sample data should be invalidated. Invalidated data are not used in subsequent calculations.

3.0 Test Results

The average emission result, in pounds per ton of metal poured, is presented in Table 3-1 for tests reported in this document. This table includes all the individual organic HAP compounds that comprise the reduced analyte list for this test series, along with the corresponding sum of VOCs, sum of HAPs, and sum of POMs. The table also includes the TGOC (THC) as Propane and HC as Hexane. Figures 3-1a through 3-1f present the five emissions indicators and individual HAP emissions data from Tables 3-1 in graphical form. Appendix B contains the detailed data including the results for all analytes measured. Table 3-2 includes the averages of the key process and source parameters and the data target ranges. All emission results are presented without blank or background correction. Detailed process and source data are presented in Appendix C.

Method 25A charts for the tests are included in Appendix D of this report. The charts are presented to show the VOC profile of emissions for each pour.

The log used during validation of the laboratory data is maintained in the Technikon offices.

Table 3-1 Test Series DQ Summary of Individual Test Results – Lbs/Ton of Metal

COMPOUND / SAMPLE NUMBER	Six Mold Average (Lb/tn)	Nine Mold Average (Lb/tn)
TGOC (THC) as Propane	2.136	2.459
HC as Hexane	0.6072	0.6435
Sum of VOCs	0.2093	0.2356
Sum of HAPs	0.1881	0.2127
Sum of POMs	ND	ND
Individual Organic HAPs		
Benzene	0.0891	0.1051
Toluene	0.0503	0.0547
Xylene (Total)	0.0371	0.0403
Ethylbenzene	0.0061	0.0068
Acetaldehyde	0.0055	0.0059
1-Methylnaphthalene	NA	NA
2-Methylnaphthalene	NA	NA
Naphthalene	NA	NA
Aniline	I	I
Phenol	I	I
Other VOCs		
Octane	0.0101	0.0117
1,2,4-Trimethylbenzene	0.0111	0.0113
Other Analytes		
Condensables	0.2147	0.2324
Carbon Monoxide	5.241	5.241
Methane	1.497	1.497
Carbon Dioxide	23.71	23.71

I: Data was rejected based on data validation considerations
All "Other Analytes" are not included in the sum of HAPs or VOCs

N/A: Not Applicable

Figure 3-1a Test DQ – Emission Indicators – Average of 9 Molds

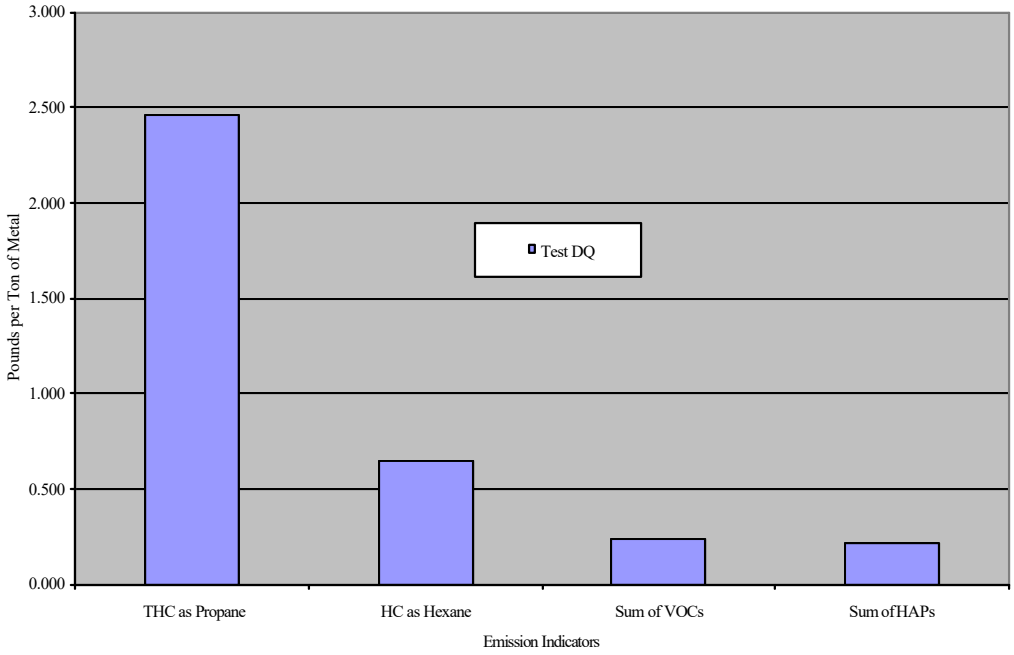

Figure 3-1b Test DQ – Emission Indicators – Average of 6 Molds

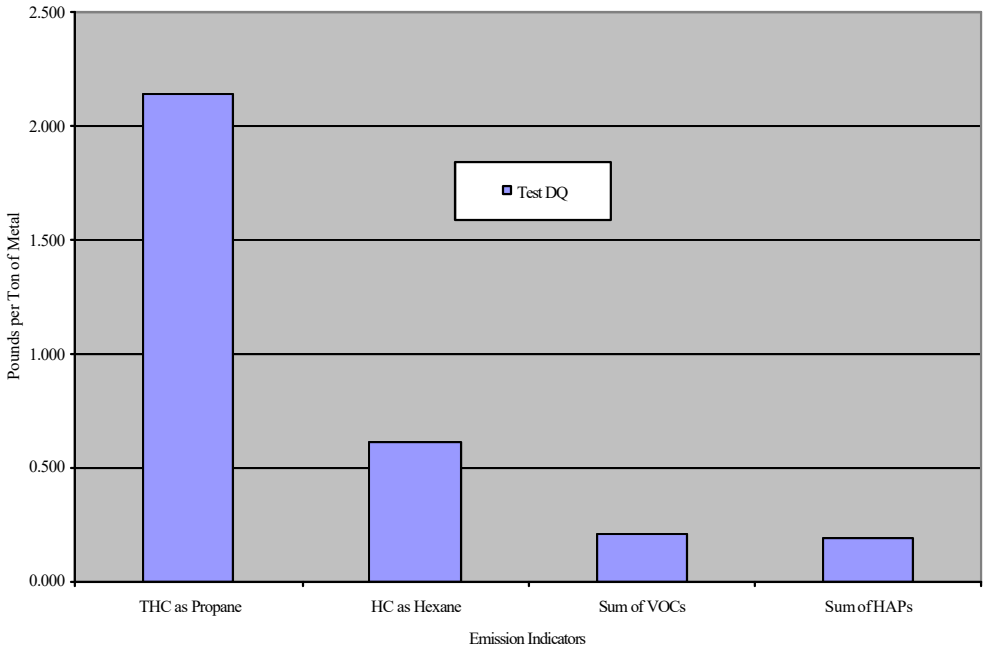

Figure 3-1c Test Series DQ – Comparison of Emission Indicators

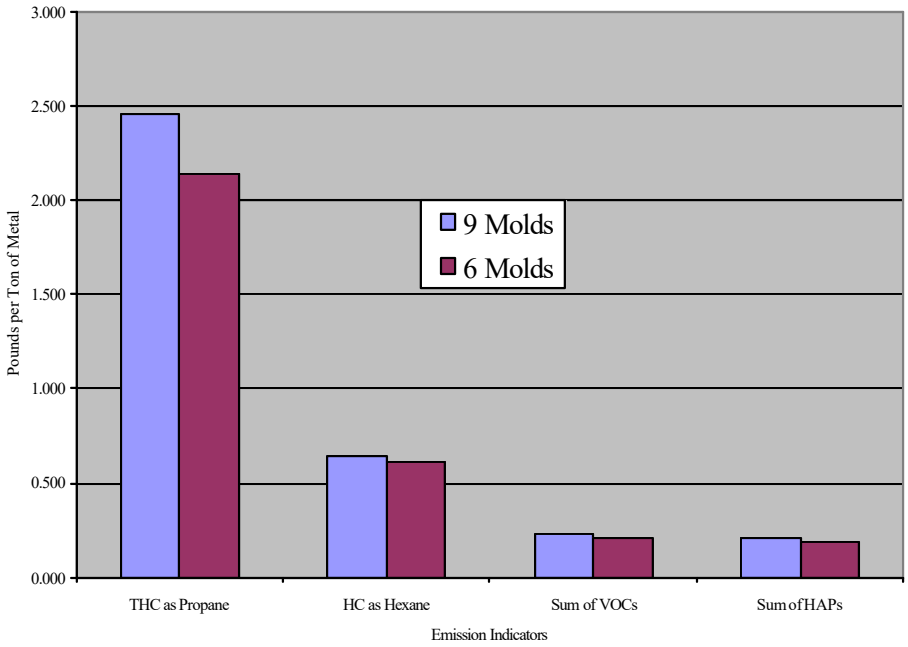

Figure 3-1d Test DQ – Selected HAPs – Average of 9 Molds

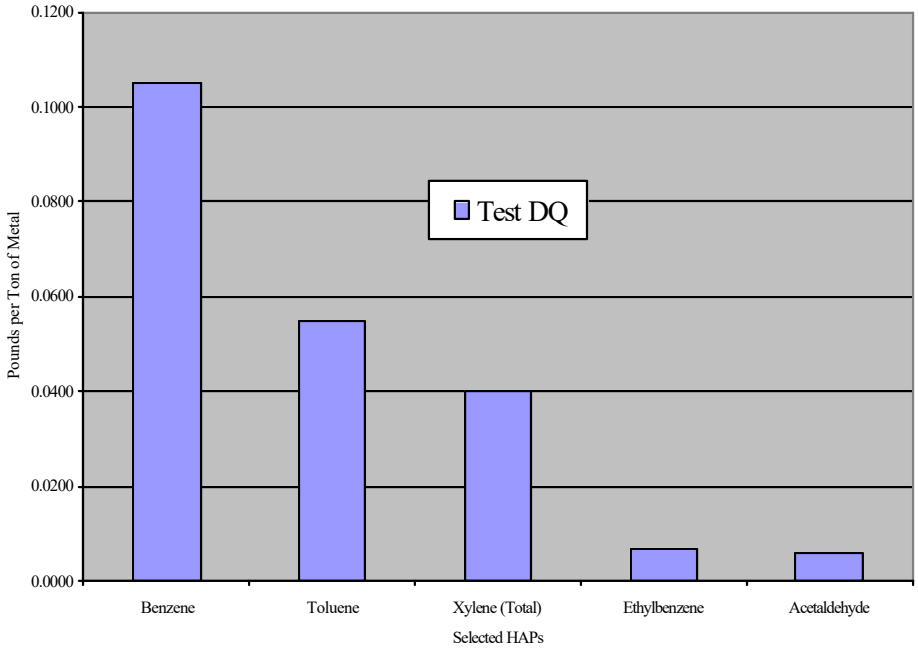

Figure 3-1e Test DQ – Selected HAPs – Average of 6 Molds

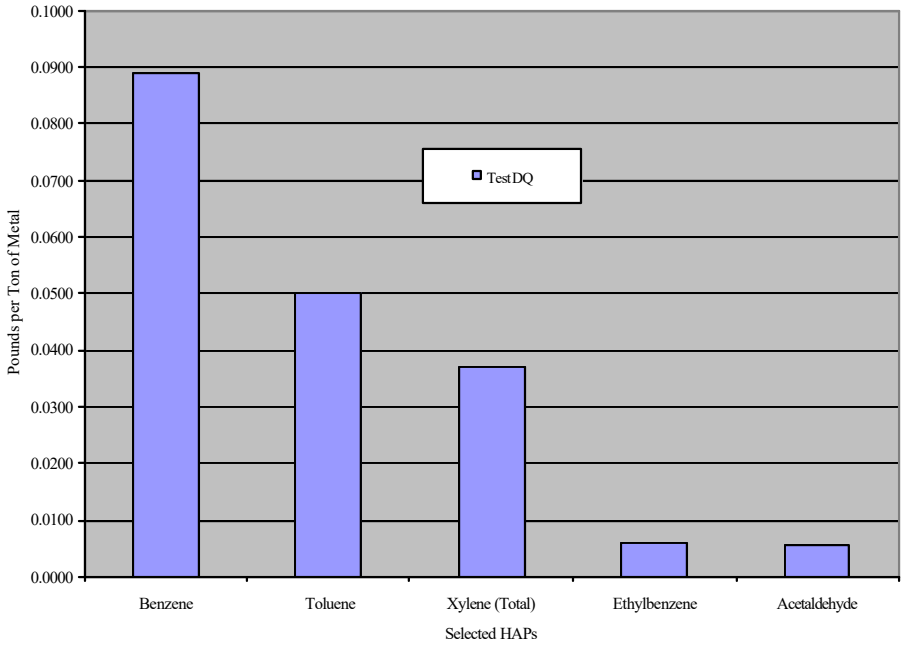

Figure 3-1f Test Series DQ – Comparison of Selected HAPs

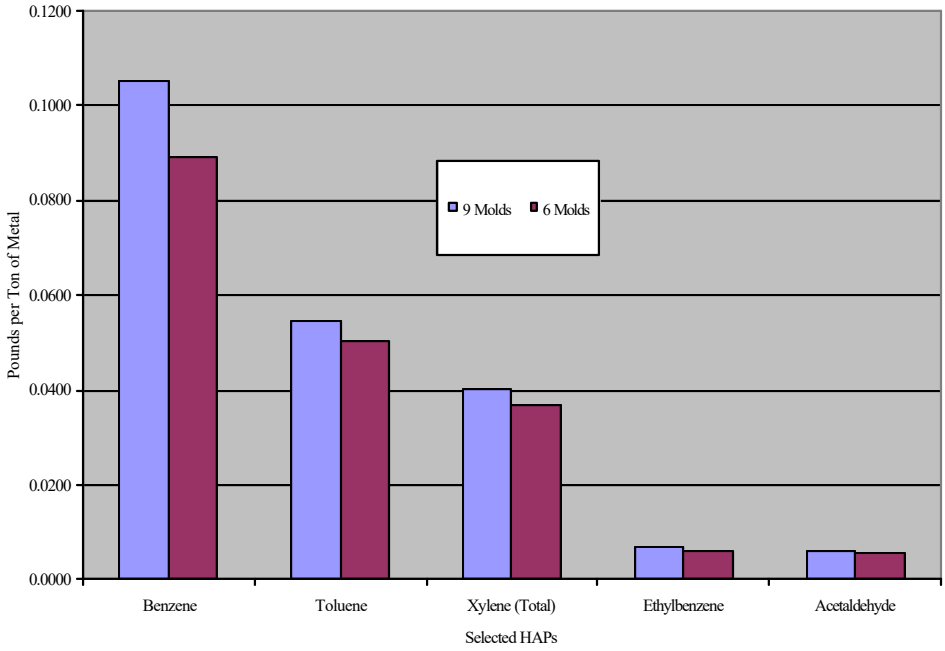

Table 3-2 Test Plan DQ - Average Process and Stack Parameters

Average Process and Stack Parameters	Average of DQ	Target Range
Casting Metal Weight, lbs.	252	240 - 250
Total Mold Weight, lbs.	1348	1350 - 1420
Total Core Weight, lbs.	59.71	58 - 60
Compactability, %	42	45 - 51
Total Binder Weight, lbs	2.84	2.8 - 3.1
Core Ratio Resin (part I) to co-reactant (part II)	N/A	N/A
Greensand mold LOI, % @ 1800°F	4.97	4.4 – 5.0
MB Clay, %	6.43	6.5 - 7.5
Core LOI, % @ 1400°F	0.62	0.2 - 0.8
Greensand Mold Volatiles, % @ 900° F	0.97	N/A
Pour Temperature, °F	2634	2620 - 2640
Mold green compressive strength, psi	13.79	8 – 15
Core Binder Content, %	4.76	4.9 - 5.1
Water Type used in Mold	Tap	Tap
Average Stack Temperature, °F	108	120 ± 20
Total Moisture Content, %	1.57	0-4
Average Stack Velocity, ft./sec.	15.89	17 ± 2
Avg. Stack Pressure, in. Hg	30.21	29.92 ± 1
Stack Flow Rate, scfm	692	700 ± 50

4.0 Discussion of Results

A selected analyte list was utilized in the analysis of stack emissions from Test Series DQ. The results for the sum of HAPs, VOCs, and POMs that are derived from this list can therefore only be compared to other test series that also utilize this reduced list. The sampling and analytical methodologies were the same for Tests DQ, DA, DR, DS, DT, and DU, so comparison of these six test series will allow the effects of advanced oxidation treatment to be evaluated against tap water for three different ratios of western/southern bentonite clays, 20/80, 50/50, and 80/20.

Two methods were employed to measure undifferentiated hydrocarbon emissions, TGOC (THC) as propane, performed in accordance with EPA Method 25A, and HC as hexane. EPA Method 25A, TGOC (as propane), is weighted to the detection of more volatile hydrocarbon species, beginning at C1 (methane), with results calibrated against a three-carbon alkane (propane). HC as hexane is weighted to detection of relatively less volatile compounds. This method detects hydrocarbon compounds in the alkane range between C6 and C16, with results calibrated against a six-carbon alkane (hexane).

TGOC results for the six post-conditioning molds exceeded HC as Hexane by a factor of approximately 3.5. When the three conditioning molds are added to the average results for these two analyses, TGOC exceeds HC as Hexane by a factor of almost 4. Average TGOC results decreased by 13% when only post-conditioning molds are considered, while HC as hexane results decreased by 5.5%.

Phenol and aniline were included in the selected analyte list, but results have not been incorporated due to sampling difficulties for the NIOSH 2002 method. Results for these analytes will be included in the comparative tests listed in the first paragraph.

Observation of measured process parameters indicates that the tests were run within an acceptable range.

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APPENDIX A APPROVED TEST PLAN FOR TEST SERIES DQ

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CERP TEST PLAN

> **CONTRACT NUMBER:** 1256 **TASK NUMBER:** 130

> **CONTROL NUMBER:** RE 1 00112

> **SAMPLE FAMILY:** DQ

> **SAMPLE EVENTS:** 001 thru 009

> **SITE:** X **PRE-PRODUCTION (243)** **CERP FOUNDRY (238)**

> **TEST TYPE:** Clay Ratio Study, using Tap Water Reference

> **MOLD TYPE:** Greensand, 20/80: Western/Southern Bentonite ratio with Seacoal and using Tap Water

> **NUMBER OF MOLDS:** 9

> **CORE TYPE**: Sodium Silicate Step Block Cores

> **TEST DATE:** **START:** 13 Dec 00

FINISH: 18 Dec 00

TEST OBJECTIVES:

Primary: To determine the effects on HAP emissions from a tap water tempered southern bentonite rich sodium silicate cored greensand mold containing Seacoal as the only known organic source and compare those emissions to test series DR (tap water, silicate core, 50/50 western/southern bentonite), DT (tap water, silicate core, 80/20 western/southern bentonite), DA (A/O water, silicate core, 20/80 western/southern bentonite), DS (A/O water, silicate core, 50/50 western/southern bentonite), and DU (A/O water, silicate core, 80/20 western/southern bentonite). This group of tests is a follow up on test DA made with virgin materials run as a single batch turns test. Series DQ will be monitored by the total hydrocarbon analyzer, sample tubes, bags, and condensate trap.

VARIABLES: Sand composition shall be maintained at 7.0 +/- 0.5 % MB clay, 5.0 +/- 0.3 % LOI using Hill & Griffith supplied clay and Seacoal. The Western Bentonite /Southern Bentonite ratio shall be 20/80. Sodium silicate step cores will be made using Wedron 420 Silica sand and 5.0 % J.B. DeVeene Kleencast #1 binder, gassed with CO_2 and dried at 250° F for two hours. The statistical validity of the test will be based on nine sampling events (molds).

BRIEF OVERVIEW: This test along with companion tests DR, DT, DA, DS, & DU is intended to determine how silicate cored green sand with 80/20, 50/50 & 20/80 western/southern bentonite ratios respond to both tap water and A/O water treatment. The bentonite content and LOI will initially be adjusted to 7.0% +/- 0.5% and 5.0% +/- 0.3% respectively. Subsequent molds will be made on a single mold "turns" basis with the bond replacement rate based on current sand lab data to maintain the clay & LOI contents within the above ranges. DQ molds will be made only after the process lab determinations or projections are complete.

SPECIAL CONDITIONS: Only tap water shall be used. The total hydrocarbon analyzer, tube samples, & condensate trap shall be used to gather and conduct emission tests on the sand to form the (9) mold test. Process effects on sand physical and mechanical properties shall be tracked**.**

Process Engineering Manager (Technikon)	12/15/00 Date
V.P. Measurement Technology (Technikon)	12-15-00 Date
V.P. Operations (Technikon)	12-15-00 Date
Emissions Team (USCAR)	2/22/01 Date
Process and Facilities Team (USCAR)	2/22/01 Date
Project Manager (CTC)	4/25/01 Date

Series DQ

Pre-production process instructions

A. Experiment: A study to compare the impact of tap water on molds with the Western/Southern Bentonite ratio of 1:4. The mold will be made from virgin green sand mold materials consisting of Seacoal; bentonite in the ratio of 1:4; tempered with tap water; poured at constant weight, surface area, sodium silicate core weight, and shape factor, a single batch turns test. This test is to be compared to reference tests DR, & DT, and comparative tests DA, DS, & DU.

1. Mold sand: Virgin mix of Wexford W450 lake sand, Okie 90 silica sand, western and southern Bentonites in ratio of 1:4, Seacoal, and tap water per recipe.

2. Core: Step core made with Wedron 420 silica sand and 5% J.B. DeVeene Kleencast #1® sodium silicate core binder, gassed with CO_2.

3. Metal: Class 30-35 gray cast iron poured at 2630°F.

Caution
Observe all safety precautions attendant to these operations as delineated in the Pre-production operating and safety instruction manual.

4. The following test shall be conducted:

a) Sand batch: Single sand batch to be used for all 9 DQ molds. All molds will be monitored in real time with the Airsense spectrometer and THC analyzer. Additionally sample tubes and condensables samples will be collected on each mold.

b) DQ001: Virgin mix as described above, vented mold, reference JB DeVeene Kleencast #1? cores, tap water.

c) DQ002-DQ009: The 20/80 western/southern bentonite comparative test; Re-mulled, reconstituted sand, tap water, vented mold, reference JB DeVeene Kleencast #1? cores.

B. Sodium silicate Core

1. Core sand mixing.

a) Clean the core sand mixer.

b) Add 50 pounds of Wedron 420 silica sand to the running mixer.

c) Slowly pour 2.5 +/- .03 pounds of Sodium silicate resin into the sand. Distribute the resin as it is poured. Avoid pouring the resin on the plows or walls of the mixer or in one location or resin balling will occur preventing proper mixing.

d) Mix for three minutes after the resin is all in.

e) One batch will make about 6 cores.

f) Once per hour catch a clean 50-100 gm sample of the raw sand for the sand lab to perform a core LOI test. Place the sample in a clean bag and label with date and time.

2. Making step cores.

a) Place the core box on a flat surface large open side up.

b) Place about 2 inches of sand in the bottom of the step section. Firmly tamp the sand into the 1inch diameter bottom using a ½ inch diameter rod.

c) Place a few more inches of sand in the core box and compact it. Take care to avoid parting planes. Repeat until the box is full.
d) Scrape off the excess. Remove the unused sand away from the gassing area.
e) Place a gassing plate on the open end of the core box.
f) Hold the plate down and gas the core for 20 seconds on each of the two gas holes with 20 psi CO2 gas.
g) Dry the cores for two hours at 250°F and allow to cool.
h) Bag the cores in moisture proof bags for storage.
i) Identify each bag by batch number.
j) Record the date, batch number, the batch mix time, sand batch weight, resin weight, the gassing time, the gas pressure, individual dried core weight, good core count from each batch.
k) The sand lab will determine the core LOI and the Resin Content LOI associated with each mold.

C. Sand preparation

1. Start up batch: make 1, DQ001.
a) Thoroughly clean the pre-production muller.
b) Weigh and add 1600 +/- 50 pounds total new Wexford W450 lake sand and Oklahoma 90 silica sand, per the recipe, to the running pre-production muller.
c) Add 5 pounds of tap water to the muller to suppress dust distributing it across the sand. Allow to mix for 1 minute.
d) Add the clays in proportion to the sand weight per the standardization mixture recipe for this test slowly to the muller to allow them to be distributed throughout the sand mass.
e) Dry mull for about 3 minutes to allow distribution and some grinding of the clays to occur.
f) Split the batch into approximately equal sized portions.
g) To each half-batch temper the sand-clay mixture slowly with tap water to allow for distribution.
h) After about 2 gallons of water have been added allow 30 seconds of mixing then start taking compactability test samples. Grab sufficient sample at each compactability test to fill a quart zip-lock bag. Label each bag and retain it.
i) Based on each test add water incrementally to adjust the temper. Allow 1 minute of mixing. Retest. Repeat until the compactability is in the range 45-51%.
j) Discharge the sand into the mold half.
k) Record the total sand mixed in the combined batch, the total of each type of clay added to the combined batch, the amount of water added to each half batch, the total mix time on each half batch, the final compactability and sand temperature at charge and discharge on each half batch, the time that the water was taken from its source, the time that each mold half was complete, the time the mold is delivered to the pour area, and the water type and temperature. Record the maximum muller current just prior to sand discharge.
l) The sand will be characterized for Methylene Blue Clay, Moisture content, Compactability, Green Compression strength, 1800°F loss on ignition (LOI), and

900°F volatiles. Each volatile and LOI test requires a separate 50-gram sample from the collected sand.

NOTE: The sand lab data must be available and approved by the process engineer before the mold is committed to pouring.

2. Re-mulling: make 8, DQ002-DQ009.
- **a)** Add all the sand from the previous mold to the muller including any sand previously mixed but not placed in the mold.
- **b)** Add 5 pounds of tap water to the muller to suppress dust distributing it across the sand. Allow to mix for 1 minute.
- **c)** Add the clays and coals per the re-bond recipe slowly to the muller to allow them to be distributed throughout the sand mass. Follow the above procedure beginning at C.1.e.
- **d)** The sand lab will sample the mold sand from each mold as it is being made and from the shaken out sand after it has been re-blended but before the additions are made. The three (3) "MOLD" samples will be taken from the initial muller discharge into the drag, from the last sand into the drag, and the last sand into the cope. The three (3) "SHAKEOUT" samples shall be taken from within the muller at three locations approximately 120 degrees apart. The sand will be tested for MB clay, compactability, and moisture content, green compression strength, 1800°F LOI, 900°F volatile. Each volatile and LOI test requires a separate 50-gram sample from the collected sand. Report results associated with the mold (test number, DQ0xx) from which it was taken.

NOTE: The sand lab data must be available from the blended shakeout sand and a recipe approved by the process engineer before the next mold is prepared. Additionally the sand lab data must be available and approved by the process engineer for the next mold's sand before the mold is committed to pouring.

NOTE: Once each day, at the time when the shakeout sand has been re-blended, the total sand shall be weighed and recorded. Extra sand shall be discarded to keep the batch weight at 1600 +/- 50 pounds.

D. Molding: Step block pattern.

1. Pattern preparation:
- **a)** Inspect and tighten all loose pattern and gating pieces.
- **b)** Repair any damaged pattern or gating parts.

2. Making the green sand mold.
- **a)** Lightly rub parting oil from a damp oil rag on the pattern particularly in the corners and recesses.

Caution: Do not pour gross amounts of parting oil on the pattern to be blown off with air. This practice will leave sufficient oil at the parting line to be adsorbed by the sand, weakening it, and the burning oil will be detected by the emission samplers.

b) Place 4 inches of loose sand on the pattern and ram all pockets and the perimeter tightly using only vertical strokes. Caution: non- vertical ramming strokes will move blocks of compacted sand leaving voids, which may cause the mold to fail. Do not ram all the sand to form a parting plane surface or the mold can fail. Add sand in increments of 4-6 inches of loose sand ramming tightly around the pattern.

c) When the rammed sand covers the pattern by 3 or more inches the sand can be rammed less tightly but still avoid lamination planes.

d) Level off the cope and drag mold surfaces opposite the pattern to minimize metal splatter and allow the mold to be fully supported.

e) Cut the pour basin smoothly to reduce the amount of sand prone to get washed down the sprue.

f) Remove the pattern, inspect and blow out the mold, and set the cores in the drag. Verify that the cores are fully set in their prints. The step cores will be flush with the parting line. If a piece of the mold is missing contact your supervision for a decision on the acceptability of the mold.

g) Vent the cope when required according to the test list above with ¼ vents according to the template.

h) Close the mold straight being careful not to crush anything.

i) Bolt the flask halves together and deliver the mold to the pouring area.

j) Weigh and record the closed unpoured mold, the core weigh, and the sand weight by difference.

E. Emission hood:

1. Loading.

a) Hoist the mold onto the shakeout deck within the emission hood.

b) Close, seal, and lock the emission hood

2. Shakeout.

a) After the cooling time prescribed in the emission test plan turn on the shakeout unit and run for the time prescribed in the emission test plan.

b) Turn off the shakeout, open the hood, remove the flask with casting, and recover the sand from the pit.

c) Weigh and record the metal poured.

d) Place the recovered sand in its entirety back into the brushed out muller and blend for three (3) minutes. Take three (3) samples from the re-blended shakeout sand. The three (3) "SHAKEOUT" samples shall be taken from within the muller at three locations 120 degrees apart. The sand will be tested for MB clay, compactability, and moisture content, green compression, 1800°F LOI, and 900°F volatile. Each volatile and LOI test requires a separate 50-gram sample from the collected sand. Report results associated with the mold (test number, DA0xx) from which it was taken.

F. Melting:

1. Initial charge:

a) Charge the furnace according to the heat recipe.

b) Place part of the steel scrap on the bottom, followed by carbon alloys, and the balance of the steel.

c) Place a pig on top on top.

d) Bring the furnace contents to the point of beginning to melt over a period of 1 hour at reduced power.
e) Add the balance of the metallic under full power until all is melted and the temperature has reached 2600 to 2700°F.
f) Slag the furnace and add the balance of the alloys.
g) Raise the temperature of the melt to 2700°F and take a DataCast 2000 sample. The temperature of the primary liquidus (TPL) must be in the range of 2200-2350°F.
h) Hold the furnace at 2500-2550°F until near ready to tap.
i) When ready to tap raise the temperature to 2700°F and slag the furnace.
j) Record all metallic and alloy additions to the furnace, tap temperature, and pour temperature. Record all furnace activities with an associated time.

2. Back charging.
a) Back charge the furnace according to the heat recipe,
b) Charge a few pieces of steel first to make a splash barrier, followed by the carbon alloys.
c) Follow the above steps beginning with F.1.e.

3. Emptying the furnace.
a) Pig the extra metal only after the last emission measurement is complete to avoid contaminating the air sample.
b) Cover the empty furnace with ceramic blanket to cool.

G. Pouring:

1. Preheat the ladle.
a) Tap 400 pounds more or less of 2700°F metal into the cold ladle.
b) Casually pour the metal back to the furnace.
c) Cover the ladle.
d) Reheat the metal to 2780 +/- 20°F.
e) Tap 450 pounds of iron into the ladle while pouring inoculating alloys onto the metal stream near its base.
f) Cover the ladle to conserve heat.
g) Move the ladle to the pour position, open the emission hood pour door and wait until the metal temperature reaches 2630 +/- 10°F.
h) Commence pouring keeping the sprue full.
i) Upon completion close the hood door, return the extra metal to the furnace, and cover the ladle.

Steven Knight
Mgr. Process Engineering
12/12/00

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/13/00											Samples to Clayton Lab.
EVENT 1											unless noted.
AIRSENSE	DQ00101										TOTAL
THC	DQ00102	X									TOTAL
NIOSH 1500 Mod.	DQ00103		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00104		1						200	2	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00105				1				0	2	QC-Manifold Blank
Excess									200	3	Excess
Excess									200	4	Excess
GAS, CO + CO2	DQ00106		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00107		1						500	6	Total
TO11	DQ00108				1				0	6	QC - Manifold Blank
Excess									500	7	Excess
NIOSH 2002	DQ00109		1						750	8	TOTAL (SKC 226-15)
NIOSH 2002	DQ00110				1				0	8	QC- Manifold Blank (SKC 226-15)
Excess									750	9	Excess
NIOSH 2011 Mod.	DQ00112		1						750	10	TOTAL (Orbo 53)
NIOSH 2011 Mod.	DQ00113				1				0	10	QC - Manifold Blanks (Orbo 53)
Excess									750	11	Excess
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00114		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/13/00											Samples to Clayton Lab.
EVENT 2											unless noted.
AIRSENSE	DQ00201										TOTAL
THC	DQ00202	X									TOTAL
NIOSH 1500 Mod.	DQ00203		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00204		1						200	2	TOTAL (Orbo 32 SM)
Excess									200	3	Excess
Excess									200	4	Excess
GAS,CO + CO2	DQ00205		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00206		1						500	6	TOTAL
TO11	DQ00207					1			500	6	TOTAL
Excess									500	7	Excess
NIOSH 2002	DQ00208		1						750	8	TOTAL (SKC 226-15)
Excess									750	9	Excess
NIOSH 2011 Mod.	DQ00209		1						750	10	TOTAL (Orbo 53)
Excess									750	11	Excess
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00210		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/13/00											Samples to Clayton Lab.
EVENT 3											unless noted.
AIRSENSE	DQ00301										TOTAL
THC	DQ00302	X									TOTAL
NIOSH 1500 Mod.	DQ00303		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00304			1					200	2	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00305		1						200	3	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00306			1					200	4	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00307				1						QC - (Orbo 32 SM)
GAS,CO + CO2	DQ00308		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00309		1						500	6	TOTAL
TO11	DQ00310			1					500	7	TOTAL
TO11	DQ00311				1						QC
NIOSH 2002	DQ00312		1						750	8	TOTAL (SKC 226-15)
NIOSH 2002	DQ00313			1					750	9	TOTAL (SKC 226-15)
NIOSH 2002	DQ00314				1						QC - (SKC 226-15)
NIOSH 2011 Mod.	DQ00315		1						750	10	TOTAL (Orbo 53)
NIOSH 2011 Mod.	DQ00316			1					750	11	TOTAL (Orbo 53)
NIOSH 2011 Mod.	DQ00317				1						QC - (Orbo 53)
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00318		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/14/00											Samples to Clayton Lab.
EVENT 4											unless noted.
AIRSENSE	DQ00401										TOTAL
THC	DQ00402	X									TOTAL
NIOSH 1500 Mod.	DQ00403		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00404		1						200	2	TOTAL (Orbo 32 SM)
Excess									200	3	Excess
Excess									200	4	Excess
GAS,CO + CO2	DQ00405		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00406		1						500	6	TOTAL
Excess									500	7	Excess
NIOSH 2002	DQ00407		1						750	8	TOTAL (SKC 226-15)
Excess									750	9	Excess
NIOSH 2011 Mod.	DQ00408		1						750	10	TOTAL (Orbo 53)
Excess									750	11	Excess
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00409		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/14/00											Samples to Clayton Lab.
EVENT 5											unless noted.
AIRSENSE	DQ00501										TOTAL
THC	DQ00502	X									TOTAL
NIOSH 1500 Mod.	DQ00503		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00504		1						200	2	TOTAL (Orbo 32 SM)
Excess									200	3	Excess
Excess									200	4	Excess
GAS,CO + CO2	DQ00505		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00506		1						500	6	TOTAL
Excess									500	7	Excess
NIOSH 2002	DQ00507		1						750	8	TOTAL (SKC 226-15)
Excess									750	9	Excess
NIOSH 2011 Mod.	DQ00508		1						750	10	TOTAL (Orbo 53)
Excess									750	11	Excess
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00509		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/14/00											Samples to Clayton Lab.
EVENT 6											unless noted.
AIRSENSE	DQ00601										TOTAL
THC	DQ00602	X									TOTAL
NIOSH 1500 Mod.	DQ00603		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00604		1						200	2	TOTAL (Orbo 32 SM)
Excess									200	3	Excess
Excess									200	4	Excess
GAS,CO + CO2	DQ00605		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00606		1						500	6	TOTAL
Excess									500	7	Excess
NIOSH 2002	DQ00607		1						750	8	TOTAL (SKC 226-15)
Excess									750	9	Excess
NIOSH 2011 Mod.	DQ00608		1						750	10	TOTAL (Orbo 53)
Excess									750	11	Excess
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00609		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/18/00											Samples to Clayton Lab.
EVENT 7											unless noted.
AIRSENSE	DQ00701										TOTAL
THC	DQ00702	X									TOTAL
NIOSH 1500 Mod.	DQ00703		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00704			1					200	2	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00705		1						200	3	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00706			1					200	4	TOTAL (Orbo 32 SM)
GAS,CO + CO2	DQ00707		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00708		1						500	6	TOTAL
TO11	DQ00709			1					500	7	TOTAL
NIOSH 2002	DQ00710		1						750	8	TOTAL (SKC 226-15)
NIOSH 2002	DQ00711			1					750	9	TOTAL (SKC 226-15)
NIOSH 2011 Mod.	DQ00712		1						750	10	TOTAL (Orbo 53)
NIOSH 2011 Mod.	DQ00713			1					750	11	TOTAL (Orbo 53)
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00714		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/18/00											Samples to Clayton Lab.
EVENT 8											unless noted.
AIRSENSE	DQ00801										TOTAL
THC	DQ00802	X									TOTAL
NIOSH 1500 Mod.	DQ00803		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00804		1						200	2	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00805				1						QC -Blank (Orbo 32 SM)
Excess									200	3	Excess
Excess									200	4	Excess
GAS,CO + CO2	DQ00806		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00807		1						500	6	TOTAL
TO11	DQ00808				1						QC - Blank
Excess									500	7	Excess
NIOSH 2002	DQ00809		1						750	8	TOTAL (SKC 226-15)
NIOSH 2002	DQ00810				1						QC -Blank(SKC 226-15)
Excess									750	9	Excess
NIOSH 2011 Mod.	DQ00811		1						750	10	TOTAL (Orbo 53)
NIOSH 2011 Mod.	DQ00812				1						QC - Blank (Orbo 53)
Excess									750	11	Excess
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00813		1						15L		Sample using opposite port

PRE-PRODUCTION DQ SERIES SAMPLE PLAN

Method	Sample #	Data	Sample	Duplicate	Blank	Breakthrough	Spike	Spike Duplicate	Flow (ml/min)	Train Channel	Comments
12/18/00											Samples to Clayton Lab.
EVENT 9											unless noted.
AIRSENSE	DQ00901										TOTAL
THC	DQ00902	X									TOTAL
NIOSH 1500 Mod.	DQ00903		1						200	1	TOTAL (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00904		1						200	2	TOTAL (Orbo 32 SM)
Excess									200	3	Excess
Excess									200	4	Excess
GAS,CO + CO2	DQ00905		1						60	5	BAG Sample to Airtoxics Lab.
TO11	DQ00906		1						500	6	TOTAL
Excess									500	7	Excess
NIOSH 2002	DQ00907		1						750	8	TOTAL (SKC 226-15)
Excess									750	9	Excess
NIOSH 2011 Mod.	DQ00908		1						750	10	TOTAL (Orbo 53)
Excess									750	11	Excess
Moisture									500	12	EPA Method 4
Excess									2500	13	
PUF	DQ00909		1						15L		Sample using opposite port

NIOSH 1500 Mod.	DQ00910						X		200		BOTTLE - Mix 1A (Orbo 32 SM)
NIOSH 1500 Mod.	DQ00911						X		200		BOTTLE - Mix 1A (Orbo 32 SM)

APPENDIX B TEST SERIES DQ - DETAILED RESULTS

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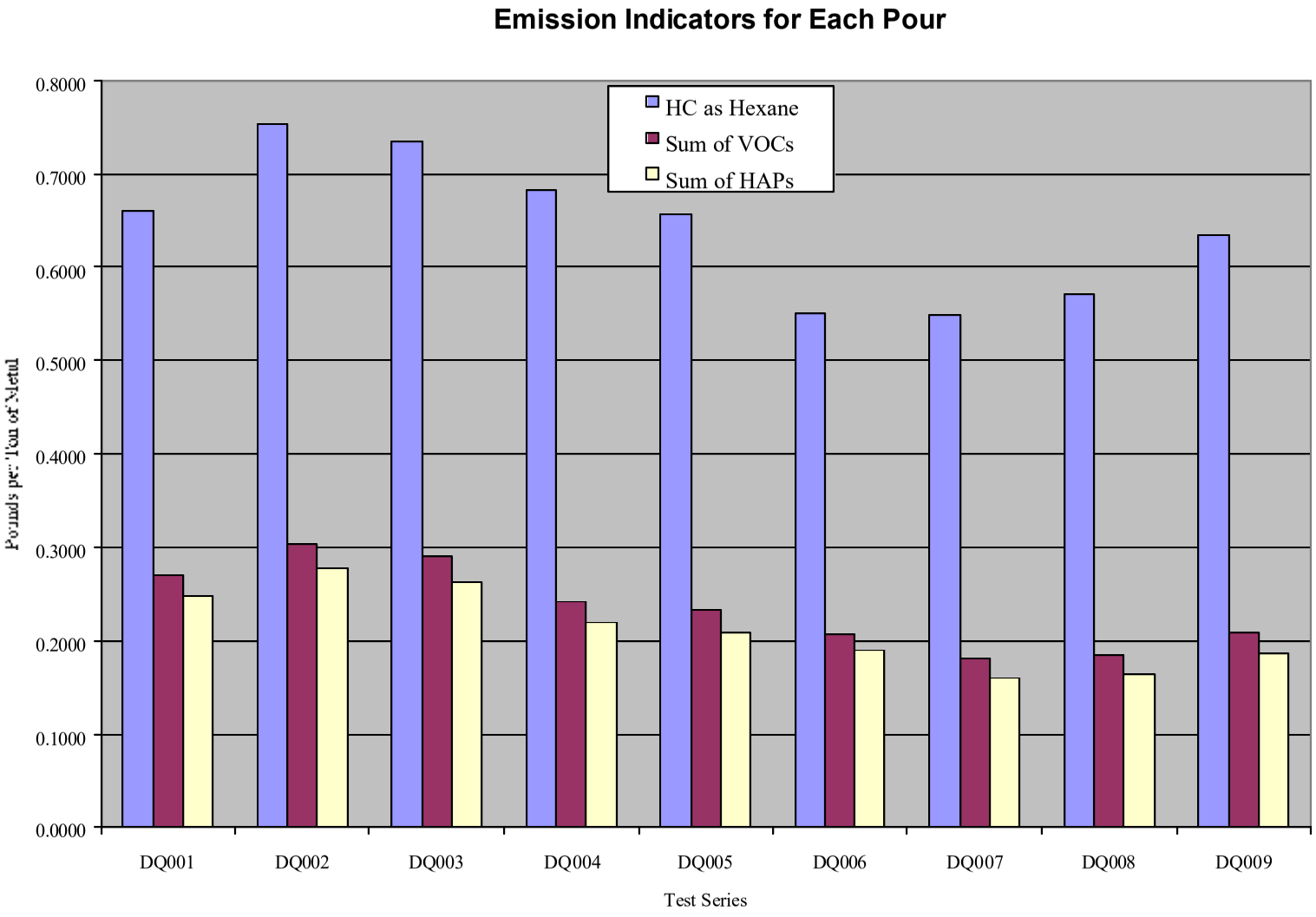
Emission Indicators for Each Pour
HC as Hexane
Sum of VOCs
Sum of HAPs
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
Pounds per Ton of Metal
DQ001
DQ002
DQ003
DQ004
DQ005
DQ006
DQ007
DQ008
DQ009
Test Series

Test Plan DQ Individual Test Results – Lbs/ton of Metal - Nine Runs

POMs	HAPS	COMPOUND / SAMPLE NUMBER	DQ001	DQ002	DQ003	DQ004	DQ005	DQ006	DQ007	DQ008	DQ009	AVERAGE	STDEV
		Pour Date	12/13/00	12/13/00	12/13/00	12/14/00	12/14/00	12/14/00	12/18/00	12/18/00	12/18/00		
		THC as Propane	3.22E+00	3.21E+00	2.88E+00	2.55E+00	2.30E+00	2.12E+00	1.95E+00	1.83E+00	2.07E+00	2.46E+00	5.34E-01
		HC as Hexane	6.61E-01	7.53E-01	7.35E-01	6.82E-01	6.56E-01	5.50E-01	5.50E-01	5.71E-01	6.34E-01	6.44E-01	7.50E-02
		Sum of VOCs	2.70E-01	3.04E-01	2.90E-01	2.42E-01	2.33E-01	2.08E-01	1.81E-01	1.84E-01	2.08E-01	2.36E-01	4.48E-02
		Sum of HAPs	2.47E-01	2.77E-01	2.62E-01	2.19E-01	2.09E-01	1.89E-01	1.61E-01	1.64E-01	1.86E-01	2.13E-01	4.19E-02
		Sum of POMs	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	N/A
		Individual HAPs and VOCs											
	z	Benzene	1.38E-01	1.43E-01	1.30E-01	1.09E-01	9.81E-02	9.52E-02	7.45E-02	7.38E-02	8.40E-02	1.05E-01	2.66E-02
	z	Toluene	5.56E-02	6.79E-02	6.70E-02	5.56E-02	5.61E-02	4.91E-02	4.42E-02	4.59E-02	5.08E-02	5.47E-02	8.40E-03
	z	Xylene (Total)	3.92E-02	5.04E-02	5.03E-02	4.13E-02	4.19E-02	3.52E-02	3.25E-02	3.43E-02	3.75E-02	4.03E-02	6.51E-03
		Octane	1.46E-02	1.59E-02	1.38E-02	1.20E-02	1.08E-02	8.71E-03	9.64E-03	9.07E-03	1.03E-02	1.17E-02	2.58E-03
		1,2,4-Trimethylbenzene	8.53E-03	1.16E-02	1.44E-02	1.07E-02	1.33E-02	9.93E-03	1.04E-02	1.10E-02	1.15E-02	1.13E-02	1.74E-03
	z	Ethylbenzene	7.09E-03	8.87E-03	8.71E-03	7.00E-03	7.17E-03	5.72E-03	5.07E-03	5.44E-03	6.08E-03	6.80E-03	1.36E-03
	z	Acetaldehyde	7.34E-03	6.69E-03	5.64E-03	5.93E-03	5.22E-03	4.10E-03	4.88E-03	5.00E-03	7.90E-03	5.85E-03	1.24E-03
x	z	1-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	N/A
x	z	2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	N/A
x	z	Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	N/A
	z	Aniline	I	I	I	I	I	I	I	I	I	N/A	N/A
	z	Phenol	I	I	I	I	I	I	I	I	I	N/A	N/A
		Other Analytes											
		Carbon Monoxide	5.40E+00	5.08E+00	NT	NT	NT	NT	NT	NT	NT	5.24E+00	2.30E-01
		Methane	1.56E+00	1.43E+00	NT	NT	NT	NT	NT	NT	NT	1.50E+00	9.14E-02
		Carbon Dioxide	3.00E+01	1.75E+01	NT	NT	NT	NT	NT	NT	NT	2.37E+01	8.85E+00
		Ethane	ND	ND	NT	NT	NT	NT	NT	NT	NT	N/A	N/A
		Propane	ND	ND	NT	NT	NT	NT	NT	NT	NT	N/A	N/A
		Isobutene	ND	ND	NT	NT	NT	NT	NT	NT	NT	N/A	N/A
		Butane	ND	ND	NT	NT	NT	NT	NT	NT	NT	N/A	N/A
		Neopentane	ND	ND	NT	NT	NT	NT	NT	NT	NT	N/A	N/A
		Isopentane	ND	ND	NT	NT	NT	NT	NT	NT	NT	N/A	N/A

Test Plan DQ Individual Test Results (continued)

POMs	HAPS	COMPOUND / SAMPLE NUMBER	DQ001	DQ002	DQ003	DQ004	DQ005	DQ006	DQ007	DQ008	DQ009	AVERAGE	STDEV
		Pentane	ND	ND	NT	NT	NT	NT	NT	NT	NT	N/A	N/A
		Condensables	3.16E-01	NA	2.55E-01	2.89E-01	2.39E-01	1.35E-01	2.04E-01	2.18E-01	2.03E-01	2.32E-01	5.63E-02

I: Data was rejected based on data validation considerations.
All "Other Analytes" are not included in the sum of HAPs or VOCs.
N/A: Not Applicable; NT: Not Tested

Test Plan DQ Individual Test Results – Lbs/ton of Metal – Six Runs

POMs	HAPS	COMPOUND / SAMPLE NUMBER	DQ004	DQ005	DQ006	DQ007	DQ008	DQ009	AVERAGE	STDEV
		Pour Date	12/14/00	12/14/00	12/14/00	12/18/00	12/18/00	12/18/00		
		THC as Propane	2.55E+00	2.30E+00	2.12E+00	1.95E+00	1.83E+00	2.07E+00	2.14E+00	2.56E-01
		HC as Hexane	6.82E-01	6.56E-01	5.50E-01	5.50E-01	5.71E-01	6.34E-01	6.07E-01	5.76E-02
		Sum of VOCs	2.42E-01	2.33E-01	2.08E-01	1.81E-01	1.84E-01	2.08E-01	2.09E-01	2.46E-02
		Sum of HAPs	2.19E-01	2.09E-01	1.89E-01	1.61E-01	1.64E-01	1.86E-01	1.88E-01	2.32E-02
		Sum of POMs	ND	ND	ND	ND	ND	ND	N/A	N/A
			Individual HAPs and VOCs							
	z	Benzene	1.09E-01	9.81E-02	9.52E-02	7.45E-02	7.38E-02	8.40E-02	8.91E-02	1.42E-02
	z	Ethylbenzene	7.00E-03	7.17E-03	5.72E-03	5.07E-03	5.44E-03	6.08E-03	6.08E-03	8.48E-04
	z	Toluene	5.56E-02	5.61E-02	4.91E-02	4.42E-02	4.59E-02	5.08E-02	5.03E-02	4.89E-03
	z	Xylene (Total)	4.13E-02	4.19E-02	3.52E-02	3.25E-02	3.43E-02	3.75E-02	3.71E-02	3.86E-03
		1,2,4-Trimethylbenzene	1.07E-02	1.33E-02	9.93E-03	1.04E-02	1.10E-02	1.15E-02	1.11E-02	1.17E-03
		Octane	1.20E-02	1.08E-02	8.71E-03	9.64E-03	9.07E-03	1.03E-02	1.01E-02	1.23E-03
	z	Acetaldehyde	5.93E-03	5.22E-03	4.10E-03	4.88E-03	5.00E-03	7.90E-03	5.50E-03	1.31E-03
x	z	1-Methylnaphthalene	ND	ND	ND	ND	ND	ND	N/A	N/A
x	z	2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	N/A	N/A
x	z	Naphthalene	ND	ND	ND	ND	ND	ND	N/A	N/A
	z	Aniline	I	I	I	I	I	I	N/A	N/A
	z	Phenol	I	I	I	I	I	I	N/A	N/A
			Other Analytes							
		Condensables	2.89E-01	2.39E-01	1.35E-01	2.04E-01	2.18E-01	2.03E-01	2.15E-01	5.06E-02
			DQ001	**DQ002**	**AVERAGE**	**STDEV**				
		Pour Date	**12/13/00**	**12/13/00**						
		Carbon Monoxide	5.40E+00	5.08E+00	5.24E+00	2.30E-01				
		Methane	1.56E+00	1.43E+00	1.50E+00	9.14E-02				
		Carbon Dioxide	3.00E+01	1.75E+01	2.37E+01	8.85E+00				
		Ethane	ND	ND	N/A	N/A				
		Propane	ND	ND	N/A	N/A				
		Isobutene	ND	ND	N/A	N/A				
		Butane	ND	ND	N/A	N/A				
		Neopentane	ND	ND	N/A	N/A				
		Isopentane	ND	ND	N/A	N/A				
		Pentane	ND	ND	N/A	N/A				

I: Data was rejected based on data validation considerations.
All "Other Analytes" are not included in the sum of HAPs or VOCs.
N/A: Not Applicable; NT: Not Tested

APPENDIX C TEST SERIES DQ - DETAILED PROCESS AND SOURCE DATA

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Test Series DQ – Detailed Process and Source Data

Description	DQ001	DQ002	DQ003	DQ004	DQ005	DQ006	DQ007	DQ008	DQ009	Averages
	12/13/00	12/13/00	12/13/00	12/14/00	12/14/00	12/14/00	12/18/00	12/18/00	12/18/00	
Casting Metal Weight, lbs.	234	234	247	240	263	318	246	247	245	252
Total Mold Weight, lbs.	1362	1375	1362	1356	1363	1316	1351	1325	1322	1348
Total Core Weight, lbs.	59.60	59.55	60.35	59.26	59.06	58.97	60.55	60.11	59.94	59.71
Compactability, %	50	48	39	47	40	37	39	44	38	42
Total Binder Weight, lbs	2.84	2.83	2.87	2.82	2.81	2.81	2.88	2.86	2.85	2.84
No. Cavities Poured	8	8	8	8	8	8	8	8	8	8
LOI, % (at mold) 1800°F	5.88	5.20	4.89	4.95	4.85	4.82	4.57	4.59	4.99	4.97
LOI, % (at shakeout) 1800°F	5.26	5.25	4.55	4.81	4.63	4.53	4.17	4.00	4.56	4.64
Clays, % (at mold)	6.07	6.33	6.46	6.33	5.81	6.46	6.85	6.72	6.85	6.43
Clays, % (at shakeout)	5.68	5.17	5.17	4.65	5.30	5.56	5.43	5.68	5.56	5.36
LOI, % (Cores) 1400°F	0.59	0.67	0.60	0.64	0.57	0.63	0.60	0.61	0.64	0.62
Volatiles, % (at mold) avg. 900°F	1.26	1.00	1.02	1.06	1.04	0.92	0.82	0.74	0.88	0.97
Volatiles, % (at shakeout) avg. 900°F	1.16	1.04	0.94	1.06	0.90	0.78	0.82	0.72	0.70	0.90
Pouring Temperature, °F	2629	2633	2638	2640	2640	2623	2639	2629	2639	2634
Mold Strength, psi	10.92	11.11	11.73	12.75	13.58	14.75	15.01	17.32	16.98	13.79
Core Binder Content, %	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76
Water Type used in Mold	Tap	Tap	Tap	Tap	Tap	Tap	Tap	Tap	Tap	N/A
Total Clays - added, lbs/mold	92.48	5.22	5.22	10.00	5.22	15.00	11.50	10.20	11.52	18.48
Seacoal - added, lbs/mold	87.04	0.00	0.00	1.00	2.00	2.00	3.00	3.00	12.00	12.23
Lignite - added, lbs/mold	-	-	-	-	-	-	-	-	-	-
Soda Ash - added, gms/mold	-	-	-	-	-	-	-	-	-	-
Mold Sand Acidity, pH	-	-	-	-	-	-	-	-	-	-
Average Stack Temperature, °F	104	104	111	104	109	118	104	107	111	108
Total Moisture Content, %	1.45	1.50	1.52	1.67	1.72	1.91	1.24	1.50	1.61	1.57

Test Series DQ – Detailed Process and Source Data

Description	DQ001	DQ002	DQ003	DQ004	DQ005	DQ006	DQ007	DQ008	DQ009	Averages
	12/13/00	12/13/00	12/13/00	12/14/00	12/14/00	12/14/00	12/18/00	12/18/00	12/18/00	
Average Stack Velocity, ft./sec.	15.9	15.9	16.0	15.8	15.9	16.0	15.8	15.8	15.9	15.89
Avg. Stack Pressure, in. Hg	30.09	30.03	30.03	30.18	30.24	30.24	30.40	30.38	30.34	30.21
Stack Flow Rate, scfm	694	693	688	694	691	684	699	695	691	692

Binder fraction = (binder (lbs)/(sand + binder (lbs)) Binder fraction x core weight used in mold = Total Binder Weight Example: (5.0 /(100 + 5.0)) = 0.0476 x 59.60 = 2.894 (lbs binder per mold).

NOTE:1 DQ006 has a high casting metal weight because of a larger than normal pour basin. Retain this test. THC data indicates the impact is less than 5% on the results and statistically, the confidence level in the conclusion is less without this test than with it.

APPENDIX D METHOD 25A CHARTS

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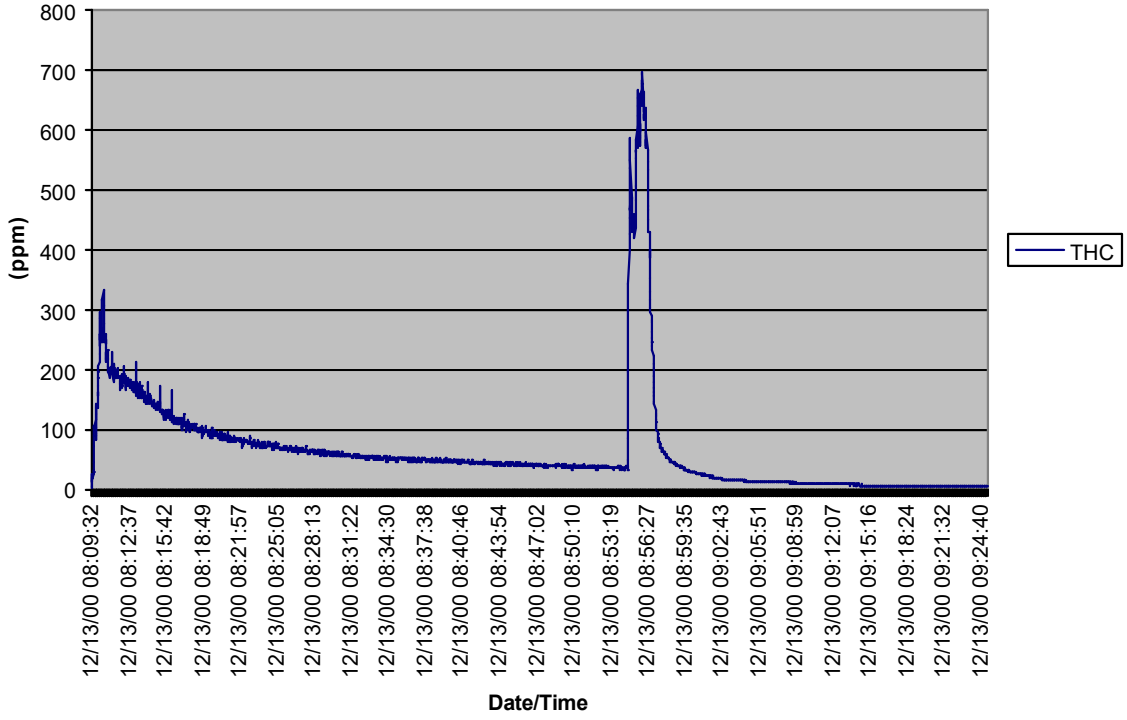
DQ001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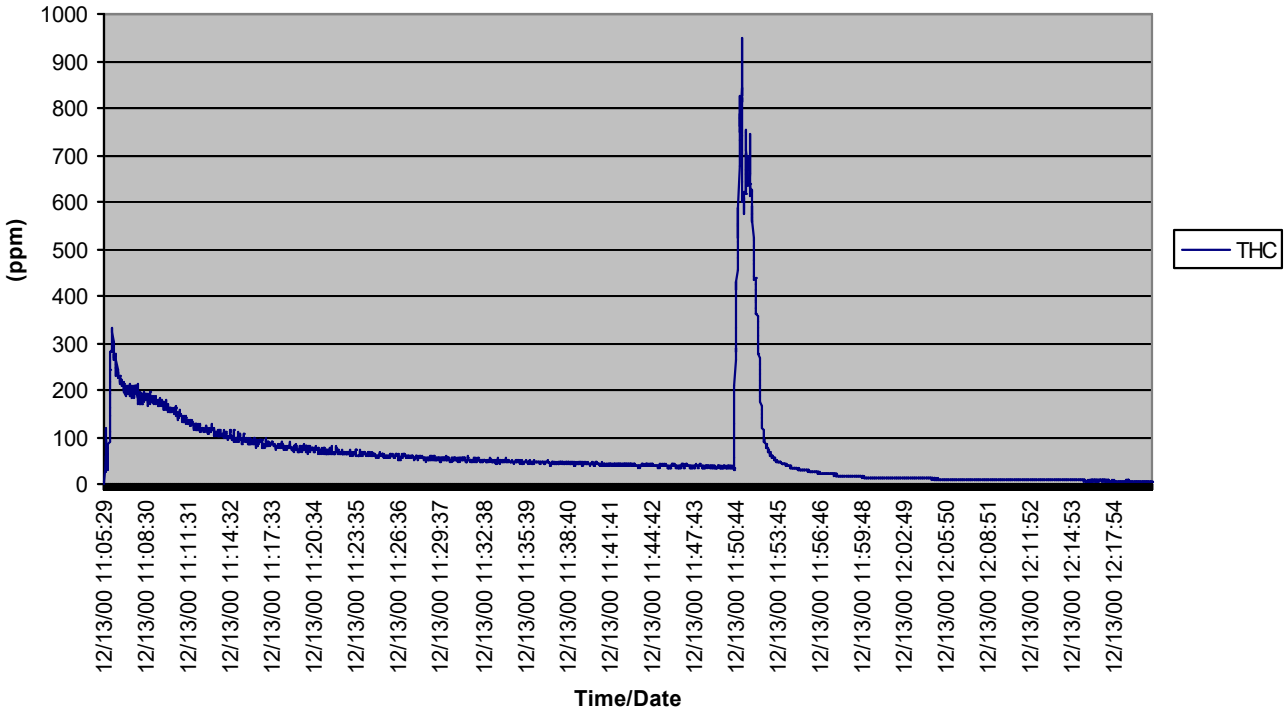
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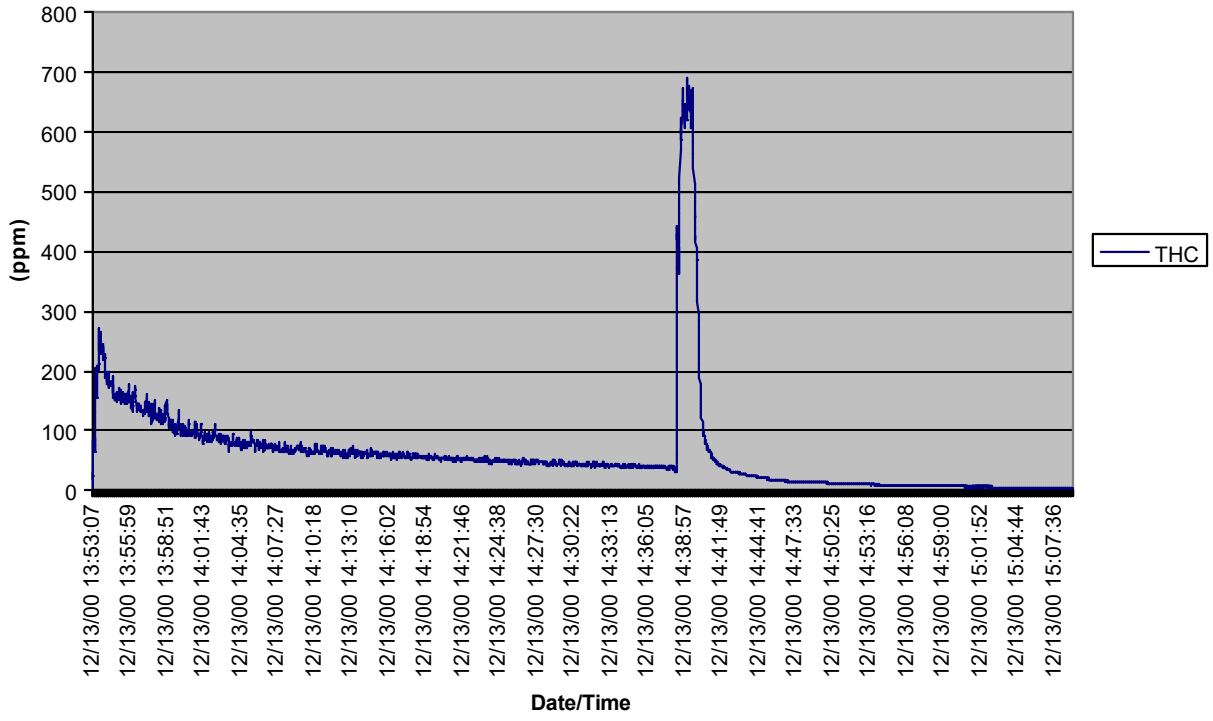
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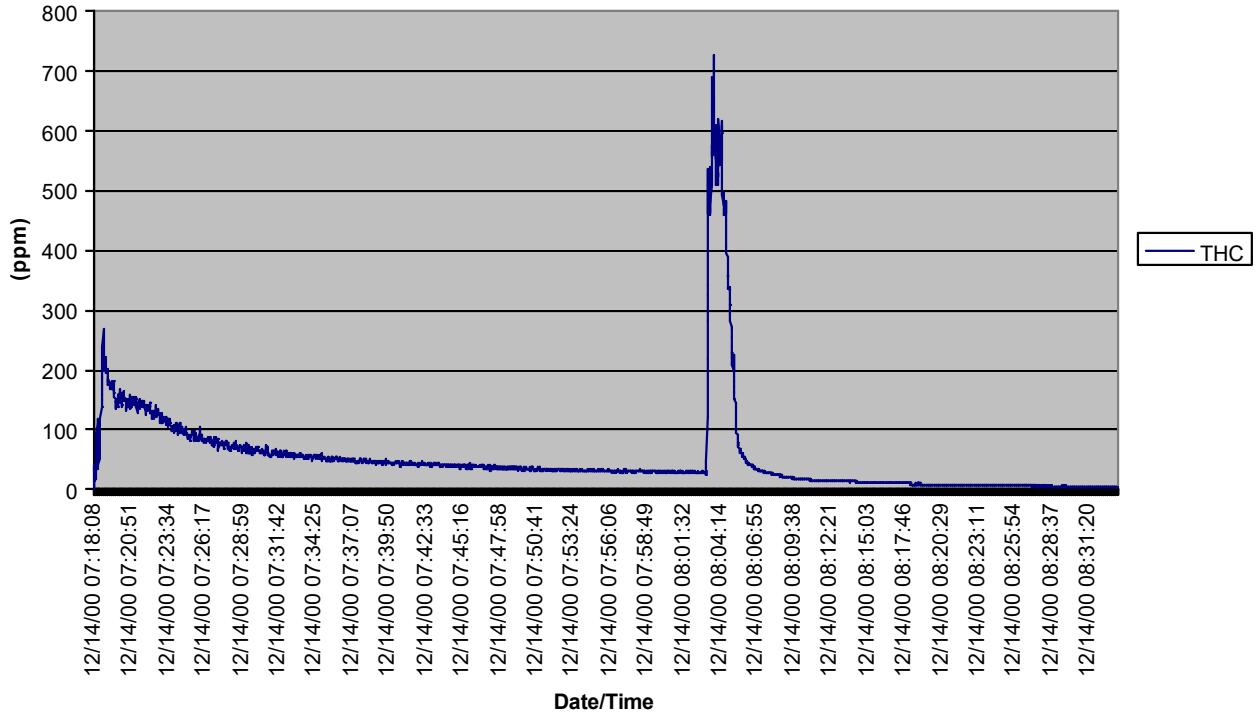
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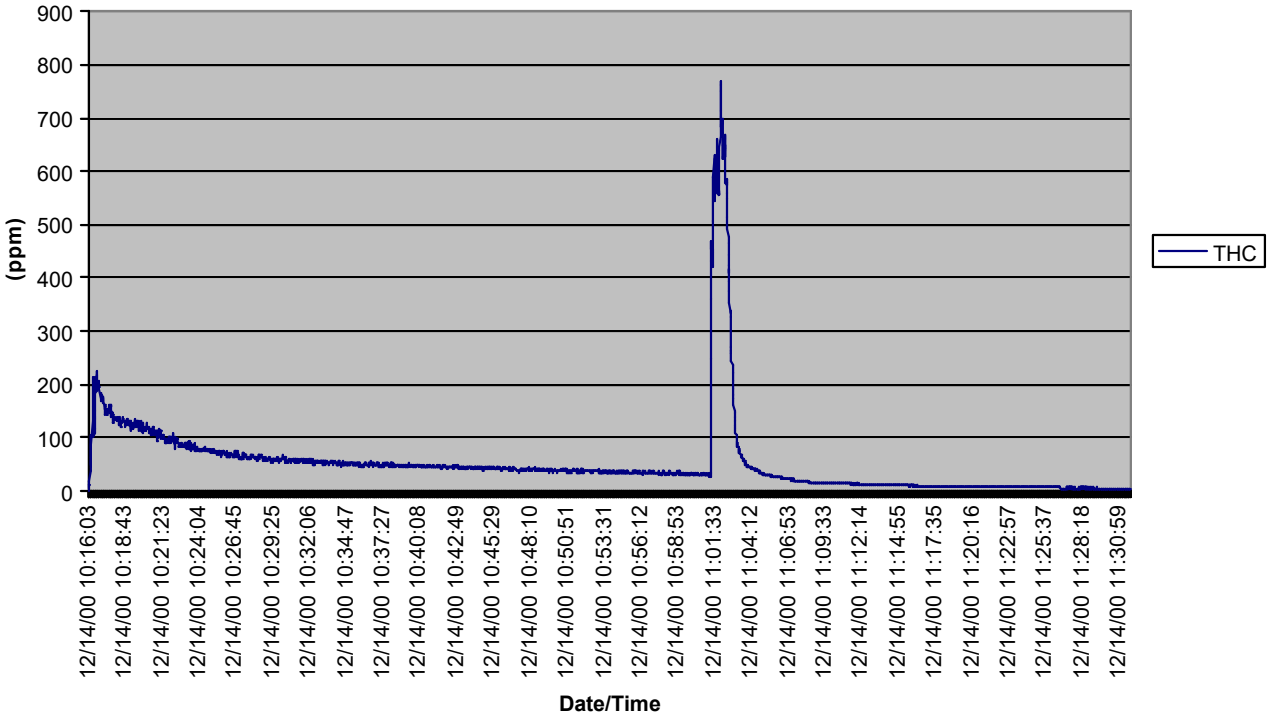
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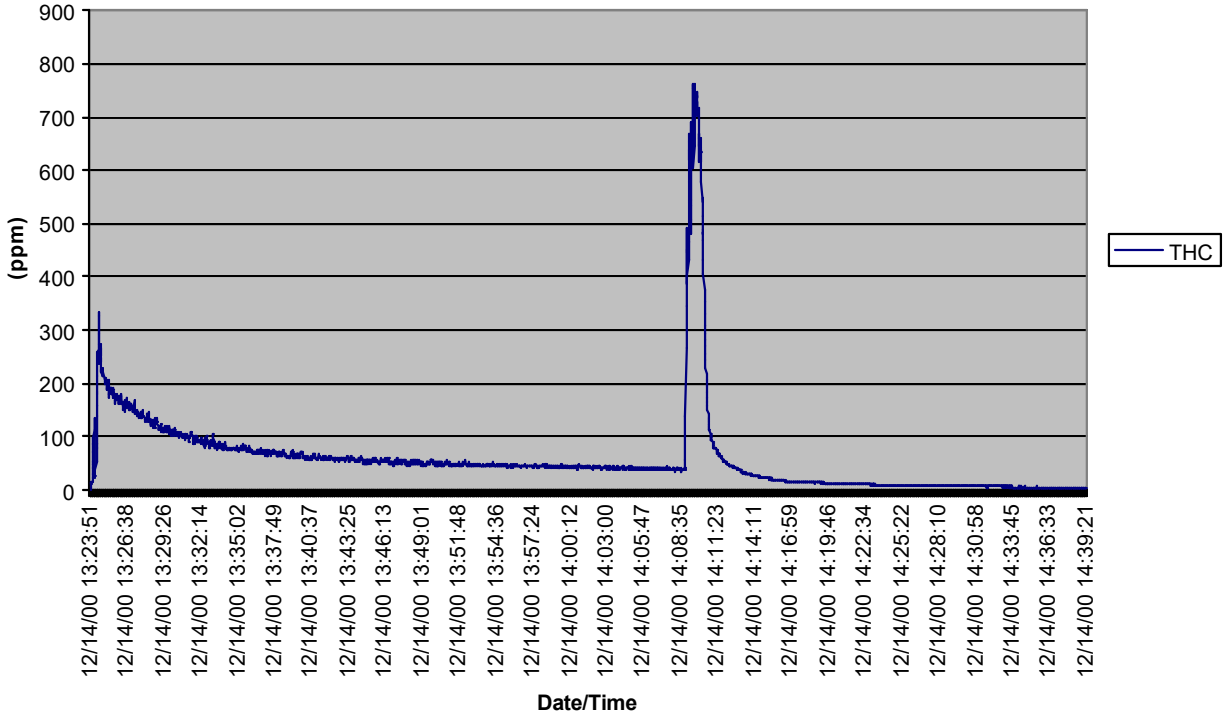
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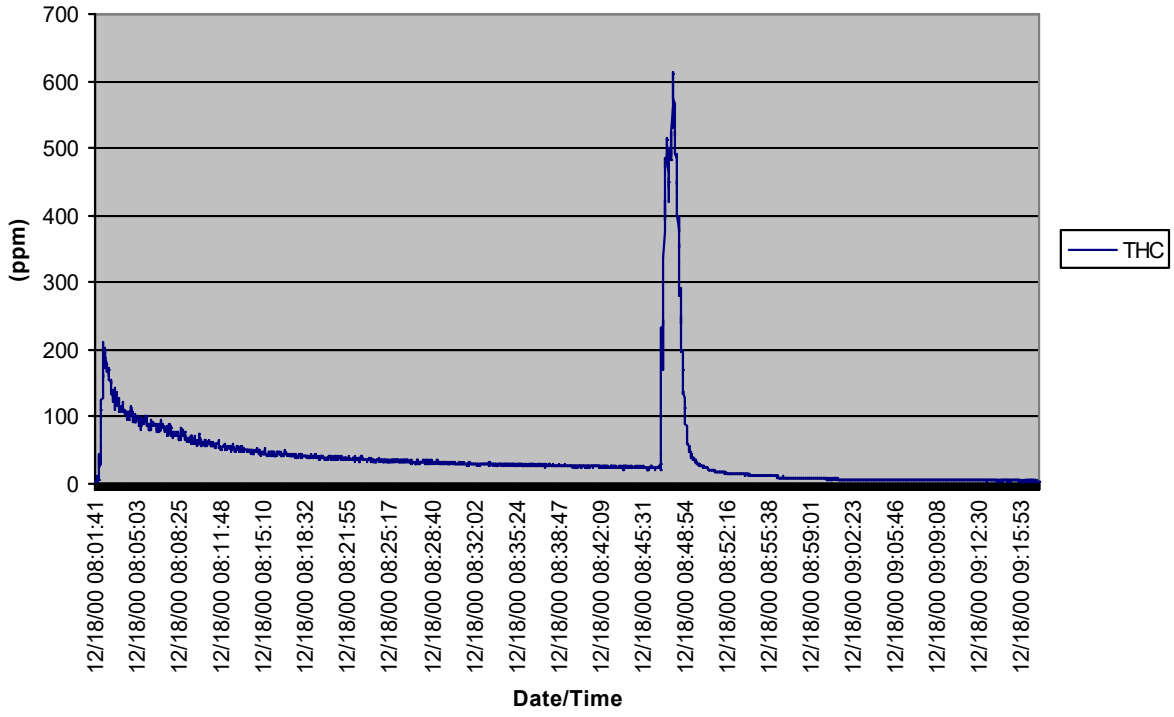
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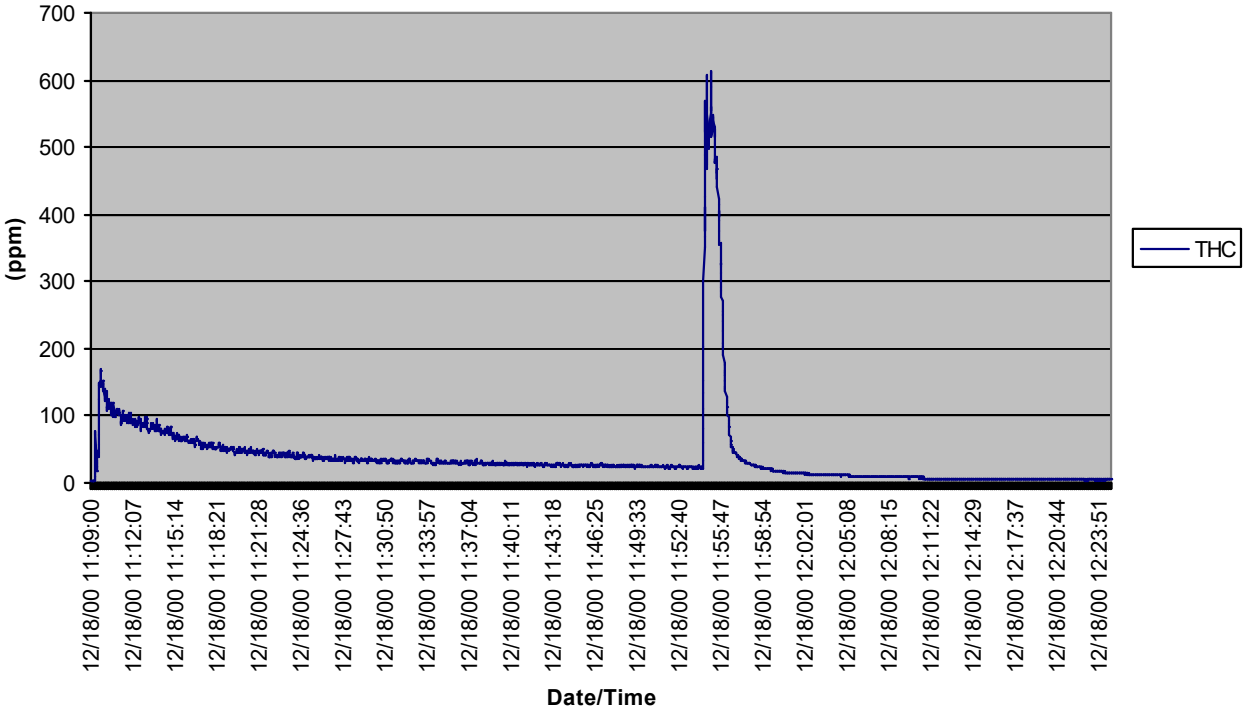
12/18/00 08:35:24
12/18/00 08:38:47
12/18/00 08:42:09
12/18/00 08:45:31
12/18/00 08:48:54
12/18/00 08:52:16
12/18/00 08:55:38
12/18/00 08:59:01
12/18/00 09:02:23
12/18/00 09:05:46
12/18/00 09:09:08
12/18/00 09:12:30
12/18/00 09:15:53
Date/Time

DQ008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600
500
400
300
200
100
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(ppm)
THC
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12/18/00 11:12:07
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12/18/00 11:18:21
12/18/00 11:21:28
12/18/00 11:24:36
12/18/00 11:27:43
12/18/00 11:30:50
12/18/00 11:33:57
12/18/00 11:37:04
12/18/00 11:40:11
12/18/00 11:43:18
12/18/00 11:46:25
12/18/00 11:49:33
12/18/00 11:52:40
12/18/00 11:55:47
12/18/00 11:58:54
12/18/00 12:02:01
12/18/00 12:05:08
12/18/00 12:08:15
12/18/00 12:11:22
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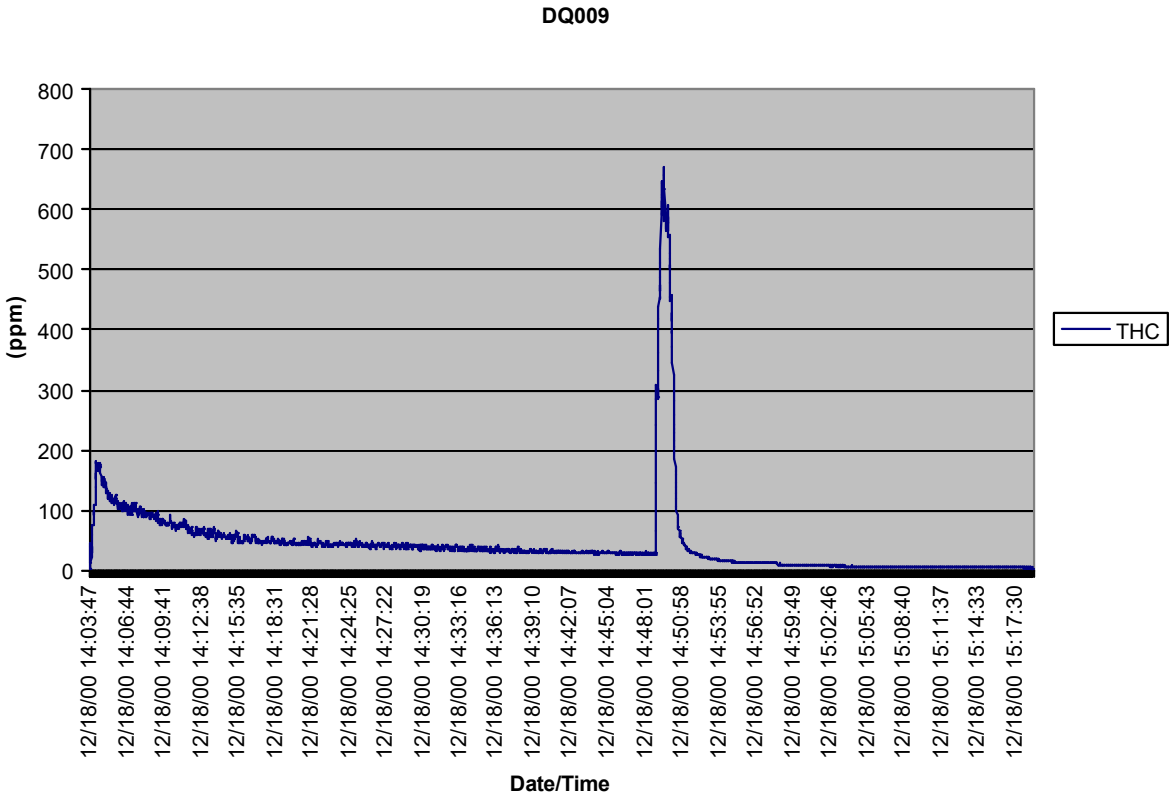
12/18/00 12:20:44
12/18/00 12:23:51
Date/Time


DQ009
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600
500
400
300
200
100
0
(ppm)
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12/18/00 14:12:38
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12/18/00 14:18:31
12/18/00 14:21:28
12/18/00 14:24:25
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12/18/00 14:30:19
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12/18/00 14:39:10
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12/18/00 14:50:58
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12/18/00 14:56:52
12/18/00 14:59:49
12/18/00 15:02:46
12/18/00 15:05:43
12/18/00 15:08:40
12/18/00 15:11:37
12/18/00 15:14:33
12/18/00 15:17:30
Date/Time
THC

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APPENDIX E LISTING OF SUPPORT DOCUMENTS

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The following documents contain specific test results, procedures, and documentation used in support of this Test Plan

1. Casting Emission Reduction Program – Foundry Product Testing Guide: Reducing Emissions by Comparative Testing, May 4, 1998.

2. Emissions Testing and Analytical Testing Standard Operating Procedures.

3. Emission Baseline Test Results for the CERP Pre-production Foundry Processes.

4. Evaluation of the Required Number of Replicate Tests to Provide Statistically Significant Air Emission Reduction Comparisons for the CERP Pre-production Foundry Test Program.

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APPENDIX F GLOSSARY

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t-Test	The calculated T statistic, Ts, is compared against a table value. The table value is a function of the sample size and on the level of confidence desired. For tests with nine sample values each, the T value associated with a confidence level of 95% is 2.12. Calculated values of Ts greater than or equal to this value would indicate that there is 95% or better probability that the differences between the two test series were not the result of test variability.
LOI	Loss On Ignition - the total weight change resulting from combustion in air at 1400^{o}F or 1800^{o}F.
ND	Non Detect, No Data
No Test	Lab testing was not done on this analyte.
HC as Undecane	Calculated by the summation of all area before elution of Hexane to after the elution of Anthracene. The quantity of THC is performed against a five-point calibration curve of Undecane by dividing the total area count from C6 to C14 to the area of Undecane curve from the initial calibration curve.

Craig Schmeisser

From: Hartman, Matthew <MATTHEW.HARTMAN@ask-chemicals.com>
Sent: Tuesday, July 27, 2021 8:54 AM
To: Craig Schmeisser
Subject: RE: PCS Emissions from FWNA Initial Installation

Craig

I have a little bit more info on a different product but similar. Do you have any CERP reports to compare. I only have one that just lists results by a single product in different technologies as opposed to several options per technology.

Compound of Interest	Pouring and Cooling (mg/g of binder)	Shakeout (mg/g of binder)	Total (mg/g of binder)
Total VOC	84.8	20.5	105.3
Carbon Monoxide (CO)	40.0	10.3	50.3
Benzene	4.14	0.08	4.22
Toluene	0.59	not detected	0.59
Ethyl Benzene	0.03	not detected	0.03
Xylenes	0.17	not detected	0.17
Naphthalene	0.89	0.23	1.12
Phenol	6.47	2.97	9.44
Propylene Carbonate	not detected	not detected	not detected
Dimethyl Succinate	5.23	1.12	6.35
Dimethyl Glutarate	12.71	3.00	15.71
Dimethyl Adipate	2.46	0.48	2.94
2-Methyl Naphthalene	not detected	not detected	not detected
1-Methyl Naphthalene	not detected	not detected	not detected
Rapeseed Methyl Ester	0.29	not detected	0.29

Table 2: Hoodstack emissions data for pouring, cooling, and shakeout for ISOCURE 106/206

Thanks

Matthew Hartman
Foundry Resins Business Line Manager

ASK Chemicals LP
495 Metro Place South
Dublin Ohio, 43017
Phone 614-763-0240
Mobile 614-404-2818
Matthew.Hartman@ask-chemicals.com

ASKCHEMICALS
We advance your casting

Matthew Hartman

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Please consider the environment before printing this e-mail!

From: Craig Schmeisser <craig.schmeisser@madriverstrategies.com>
Sent: Monday, July 26, 2021 1:22 PM
To: Hartman, Matthew <MATTHEW.HARTMAN@ask-chemicals.com>
Subject: FW: PCS Emissions from FWNA Initial Installation

Hi Matthew,
I haven't see a response to the below. Can you provide any feedback? Thanks.

From: Craig Schmeisser
Sent: Monday, July 12, 2021 9:24 PM
To: Hartman, Matthew <MATTHEW.HARTMAN@ask-chemicals.com>
Subject: RE: PCS Emissions from FWNA Initial Installation

Hi Matthew,
Thanks for the VOC and CO information. In addition to VOC/CO (and other criteria pollutants), we need to estimate the emissions of hazardous air pollutants (HAPs) and Ky regulates other toxic air contaminants (TACs) via an obscure rule. Do you have any organic HAP information? If not, any idea which CERP report may more closely align with the emissions from 109/209? Regards.

From: Hartman, Matthew <MATTHEW.HARTMAN@ask-chemicals.com>
Sent: Monday, July 12, 2021 3:53 PM
To: Craig Schmeisser <craig.schmeisser@madriverstrategies.com>
Subject: RE: PCS Emissions from FWNA Initial Installation

Craig

For Isocure Focus 109/209 that is used at Fritz Winter we have VOC (mg/g binder) and CO (mg/g binder) for pour and shakeout. OCMA VOC data is below also for them. Sand and resin are from their process.

Isocure Focus 109/209

	Total Voc	CO
Pouring	9.9	8.5
Shakeout	1.9	2.1
Total	11.8	10.6

	Mix 1
Sand	Fritz Winter Gelhar 50
Sand Additive %	-
Sand Additive	-
Lot #	-
Resin % & Ratio	109/209 @ 1.2% & 50/50
Resin Part 1	Isocure 109
Lot #	Lab Made
Resin Part 2	Isocure 209
Lot #	Lab Made
Total Resin	36

109/209	
24 HR Wt. Loss (g.) due to Volatiles	1.01
24 HR Pound Volatile loss/Ton Sand	0.67
24 HR Pound Volatile loss/Pound Binder	0.0281

Matthew Hartman
Foundry Resins Business Line Manager

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Please consider the environment before printing this e-mail!

From: Craig Schmeisser <craig.schmeisser@madriverstrategies.com>
Sent: Monday, July 12, 2021 11:15 AM
To: Hartman, Matthew <MATTHEW.HARTMAN@ask-chemicals.com>
Subject: PCS Emissions from FWNA Initial Installation

Good morning Matthew,
See page 19, Runs 020-022 of the Rheotec XL+ binder system was used to determine the emission rates from PCS (green sand mold, PUCB core). I've never heard of the product and I don't know why it was selected.

I'll find the core making emission information and send over to you within the hour.

mad river strategies llc
Craig S. Schmeisser
Mad River Strategies, LLC
craig.schmeisser@madriverstrategies.com
614.425.6392

Rustillo 4175 Evaporation Study				
Time	***Weight** (No Tare Including Cylinder)	**Volume** (mL) (5 mL increments)	**RH (%)**	**Temp (°F)**
9:45 AM	0.95	210	20%	71°
11:45 AM	0.95	210	23%	71°
1:45 PM	0.95	210	23%	71°
3:45 PM	0.90	210	23%	72°
5:45 PM	0.90	210	23%	72°
7:45 PM	0.90	210	23%	72°
9:45 PM	0.90	210	23%	72°
11:45 PM	0.90	210	22%	72°
1:45 AM	0.90	210	22%	72°
3:45 AM	0.90	210	22%	72°
5:45 AM	0.90	210	22%	71°
7:45 AM	0.90	210	22%	71°
9:45 AM	0.90	210	22%	71°
11:45 AM	0.90	210	22%	71°

*We conclude 0 < 0.05 lb (23) gram evaporation over 24 hours
Scale sensitivty is 0.05

Dry graduated cylinder weight = 0.45 lb

ANALYTICAL REPORT

June 10, 2021

ENSAFE, Bowling Green, KY

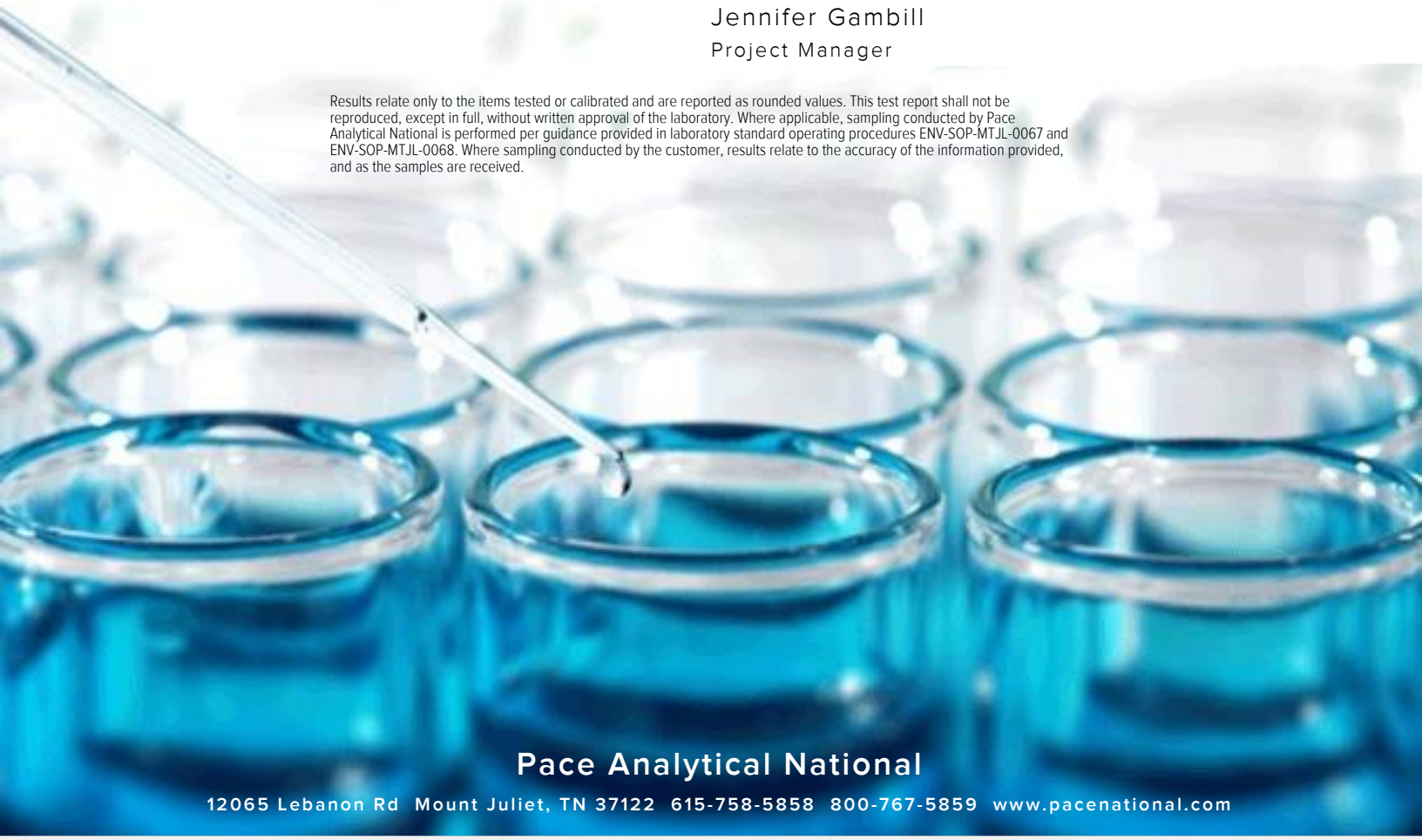
Sample Delivery Group:	L1359379
Samples Received:	05/28/2021
Project Number:	
Description:	0888828410

Report To: Joe Willcox
1148 College Street
Bowling Green, KY 42101

Entire Report Reviewed By:

Jennifer Gambill
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



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SAMPLE SUMMARY

FETTLING L1359379-01 Solid

Collected by: Eddie G Butler | Collected date/time: 05/20/21 13:45 | Received date/time: 05/28/21 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1680750	1	06/03/21 16:19	06/04/21 11:58	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1680437	10	06/08/21 17:40	06/10/21 10:54	EL	Mt. Juliet, TN

CORE L1359379-02 Solid

Collected by: Eddie G Butler | Collected date/time: 05/20/21 13:41 | Received date/time: 05/28/21 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1680750	1	06/03/21 16:19	06/04/21 12:14	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1680437	1	06/08/21 17:40	06/10/21 08:37	EL	Mt. Juliet, TN

SAND L1359379-03 Solid

Collected by: Eddie G Butler | Collected date/time: 05/20/21 13:50 | Received date/time: 05/28/21 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1680750	1	06/03/21 16:19	06/04/21 12:16	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1680437	1	06/08/21 17:40	06/10/21 08:40	EL	Mt. Juliet, TN

MELT L1359379-04 Solid

Collected by: Eddie G Butler | Collected date/time: 05/20/21 13:54 | Received date/time: 05/28/21 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1680750	1	06/03/21 16:19	06/04/21 12:19	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1680437	10	06/08/21 17:40	06/10/21 10:57	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1680437	50	06/08/21 17:40	06/10/21 14:27	EL	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jennifer Gambill
Project Manager

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.0180	0.0400	1	06/04/2021 11:58	WG1680750

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		5.44	20.0	10	06/10/2021 10:54	WG1680437
Arsenic	19.4	J	5.18	20.0	10	06/10/2021 10:54	WG1680437
Beryllium	U		0.315	2.00	10	06/10/2021 10:54	WG1680437
Cadmium	0.863	J	0.471	5.00	10	06/10/2021 10:54	WG1680437
Chromium	1360		1.33	10.0	10	06/10/2021 10:54	WG1680437
Cobalt	26.0		0.811	10.0	10	06/10/2021 10:54	WG1680437
Lead	18.2		2.08	5.00	10	06/10/2021 10:54	WG1680437
Manganese	8650		1.33	10.0	10	06/10/2021 10:54	WG1680437
Nickel	375		1.32	20.0	10	06/10/2021 10:54	WG1680437
Selenium	18.6	J	7.64	20.0	10	06/10/2021 10:54	WG1680437

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.0180	0.0400	1	06/04/2021 12:14	WG1680750

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		0.544	2.00	1	06/10/2021 08:37	WG1680437
Arsenic	1.62	J	0.518	2.00	1	06/10/2021 08:37	WG1680437
Beryllium	0.529		0.0315	0.200	1	06/10/2021 08:37	WG1680437
Cadmium	0.111	J	0.0471	0.500	1	06/10/2021 08:37	WG1680437
Chromium	11.6		0.133	1.00	1	06/10/2021 08:37	WG1680437
Cobalt	1.69		0.0811	1.00	1	06/10/2021 08:37	WG1680437
Lead	9.15		0.208	0.500	1	06/10/2021 08:37	WG1680437
Manganese	248		0.133	1.00	1	06/10/2021 08:37	WG1680437
Nickel	5.04		0.132	2.00	1	06/10/2021 08:37	WG1680437
Selenium	U		0.764	2.00	1	06/10/2021 08:37	WG1680437

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.0180	0.0400	1	06/04/2021 12:16	WG1680750

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		0.544	2.00	1	06/10/2021 08:40	WG1680437
Arsenic	3.48		0.518	2.00	1	06/10/2021 08:40	WG1680437
Beryllium	1.07		0.0315	0.200	1	06/10/2021 08:40	WG1680437
Cadmium	0.112	J	0.0471	0.500	1	06/10/2021 08:40	WG1680437
Chromium	9.65		0.133	1.00	1	06/10/2021 08:40	WG1680437
Cobalt	2.97		0.0811	1.00	1	06/10/2021 08:40	WG1680437
Lead	18.5		0.208	0.500	1	06/10/2021 08:40	WG1680437
Manganese	152		0.133	1.00	1	06/10/2021 08:40	WG1680437
Nickel	6.46		0.132	2.00	1	06/10/2021 08:40	WG1680437
Selenium	1.64	J	0.764	2.00	1	06/10/2021 08:40	WG1680437

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	1.30		0.0180	0.0400	1	06/04/2021 12:19	WG1680750

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		5.44	20.0	10	06/10/2021 10:57	WG1680437
Arsenic	75.1		5.18	20.0	10	06/10/2021 10:57	WG1680437
Beryllium	U		0.315	2.00	10	06/10/2021 10:57	WG1680437
Cadmium	51.3		0.471	5.00	10	06/10/2021 10:57	WG1680437
Chromium	491		1.33	10.0	10	06/10/2021 10:57	WG1680437
Cobalt	36.1		0.811	10.0	10	06/10/2021 10:57	WG1680437
Lead	5140		2.08	5.00	10	06/10/2021 10:57	WG1680437
Manganese	34000		6.65	50.0	50	06/10/2021 14:27	WG1680437
Nickel	142		1.32	20.0	10	06/10/2021 10:57	WG1680437
Selenium	26.7		7.64	20.0	10	06/10/2021 10:57	WG1680437

Method Blank (MB)

(MB) R3663337-1 06/04/21 11:26

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Mercury	U		0.0180	0.0400

Laboratory Control Sample (LCS)

(LCS) R3663337-2 06/04/21 11:28

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.500	0.498	99.6	80.0-120	

L1359035-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1359035-01 06/04/21 11:35 • (MS) R3663337-3 06/04/21 11:38 • (MSD) R3663337-4 06/04/21 11:40

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.500	U	0.457	0.471	91.5	94.2	1	75.0-125			2.93	20

L1359035-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1359035-09 06/04/21 11:43 • (MS) R3663337-5 06/04/21 11:45 • (MSD) R3663337-6 06/04/21 11:48

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.500	U	0.486	0.509	97.1	102	1	75.0-125			4.77	20

Method Blank (MB)

(MB) R3665484-1 06/10/21 07:18

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Antimony	U		0.544	2.00
Arsenic	U		0.518	2.00
Beryllium	U		0.0315	0.200
Cadmium	U		0.0471	0.500
Chromium	U		0.133	1.00
Cobalt	U		0.0811	1.00
Lead	U		0.208	0.500
Manganese	U		0.133	1.00
Nickel	U		0.132	2.00
Selenium	U		0.764	2.00

Laboratory Control Sample (LCS)

(LCS) R3665484-2 06/10/21 07:21

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Antimony	100	93.0	93.0	80.0-120	
Arsenic	100	92.2	92.2	80.0-120	
Beryllium	100	97.1	97.1	80.0-120	
Cadmium	100	93.0	93.0	80.0-120	
Chromium	100	98.8	98.8	80.0-120	
Cobalt	100	99.2	99.2	80.0-120	
Lead	100	98.2	98.2	80.0-120	
Manganese	100	97.1	97.1	80.0-120	
Nickel	100	101	101	80.0-120	
Selenium	100	92.9	92.9	80.0-120	

L1359349-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1359349-11 06/10/21 07:24 • (MS) R3665484-5 06/10/21 07:33 • (MSD) R3665484-6 06/10/21 07:36

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	100	U	50.8	52.5	50.8	52.5	1	75.0-125	J6	J6	3.29	20
Arsenic	100	12.5	113	104	101	91.2	1	75.0-125			8.88	20
Beryllium	100	0.448	92.8	91.8	92.4	91.4	1	75.0-125			1.10	20
Cadmium	100	0.0816	89.7	88.6	89.7	88.5	1	75.0-125			1.25	20
Chromium	100	9.56	103	101	93.7	91.8	1	75.0-125			1.90	20
Cobalt	100	12.3	111	105	98.4	92.8	1	75.0-125			5.17	20
Lead	100	13.3	115	109	101	95.2	1	75.0-125			5.52	20

L1359349-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1359349-11 06/10/21 07:24 • (MS) R3665484-5 06/10/21 07:33 • (MSD) R3665484-6 06/10/21 07:36

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Manganese	100	457	647	518	191	61.8	1	75.0-125	V	J3 V	22.1	20
Nickel	100	14.3	119	115	105	100	1	75.0-125			4.06	20
Selenium	100	U	87.3	87.9	87.3	87.9	1	75.0-125			0.758	20

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
V	The sample concentration is too high to evaluate accurate spike recoveries.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

CHAIN-OF-CUSTODY Analytical Request Document

Pace Analytical®

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here

ALL SHADED AREAS are for LAB USE ONLY

Company: Fritz Winter North America, LP	Billing Information: EnSafe AP - Memphis
Address: 1 Fritz Winter Drive, Franklin, KY 42134	
Report To: Eddie G Butler	Email To: eddie.butler@fritzwinter.us
Copy To: jwillcox@ensafe.com	Site Collection Info/Address: Fritz Winter-NA/Same
Customer Project Name/Number: 088828410	State: KY County/City: Simpson Time Zone Collected: [ ] PT [ ] MT [✓] CT [ ] ET
Phone: 270-813-4000 x172 Email: eddie.butler@fritzwinter.us	Site/Facility ID #:
Collected By (print): Eddie G Butler	Purchase Order #: Quote #:
Collected By (signature):	Turnaround Date Required:
Sample Disposal: [✓] Dispose as appropriate [ ] Return [ ] Archive: _____ [ ] Hold: _____	Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)

Compliance Monitoring? [✓] Yes [ ] No

DW PWS ID #:

DW Location Code:

Immediately Packed on Ice: [ ] Yes [✓] No

Field Filtered (if applicable): [ ] Yes [ ] No

Analysis: _____

Container Preservative Type **

Lab Project Manager: LB59379

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____

Analyses

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Total Metals (Sb,As,Be,Cd,Cr,Co,Pb,Mn,Hg,Ni,Se)	
Fettling	SL	Grab	5/20/21	1:45pm					X	-01
Core	SL	Grab	5/20/21	1:41pm					X	-02
Sand	SL	Grab	5/20/21	1:50pm					X	-03
Melt	SL	Grab	5/20/21	1:54pm					X	-04

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y	N	NA
Custody Signatures Present	Y	N	NA
Collector Signature Present	Y	N	NA
Bottles Intact	Y	N	NA
Correct Bottles	Y	N	NA
Sufficient Volume	Y	N	NA
Samples Received on Ice	Y	N	NA
VOA - Headspace Acceptable	Y	N	NA
USDA Regulated Soils	Y	N	NA
Samples in Holding Time	Y	N	NA
Residual Chlorine Present	Y	N	NA
Cl Strips: _____			
Sample pH Acceptable	Y	N	NA
pH Strips: _____			
Sulfide Present	Y	N	NA
Lead Acetate Strips: _____			

LAB USE ONLY:
Lab Sample # / Comments:

Customer Remarks / Special Conditions / Possible Hazards:

Deliver Results in mg/kg

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #:

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:

Temp Blank Received: Y N NA

Therm ID#: _____

Cooler 1 Temp Upon Receipt: 4mb oC

Cooler 1 Therm Corr. Factor: _____ oC

Cooler 1 Corrected Temp: _____ oC

Comments:

Relinquished by/Company: (Signature) FW-NA	Date/Time: 5/21/21 4:30 PM	Received by/Company: (Signature)	Date/Time: 5/21/21 16:30
Relinquished by/Company: (Signature)	Date/Time: 5/28/21 15:00	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time: 5/28/21 1500

B127

Acctnum:

Template:

Prelogin:

PM:

PB:

Trip Blank Received: Y N NA

HCL MeOH TSP Other

Non Conformance(s): YES / NO

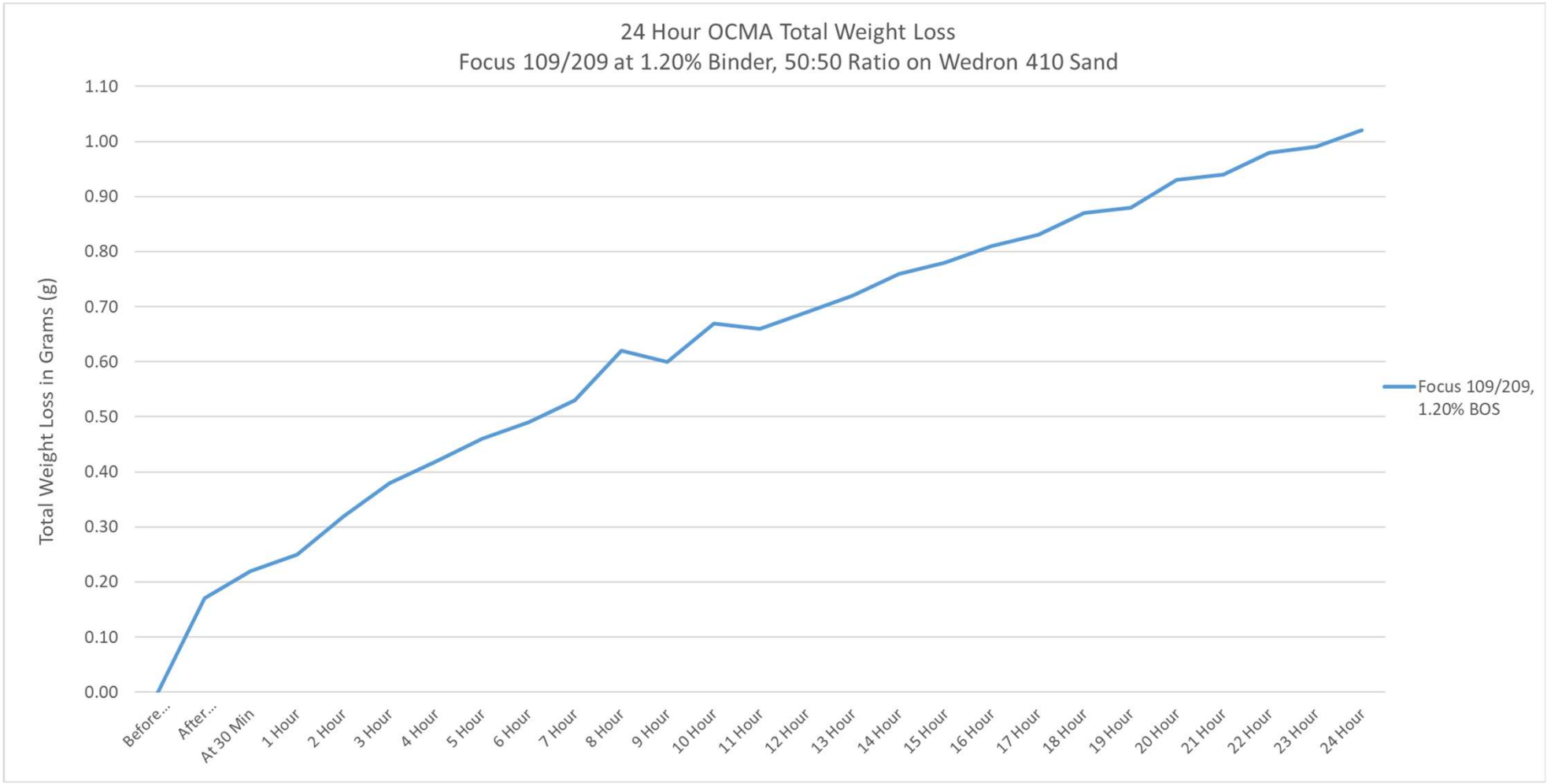
Page: _____ of: _____

FRITZ WINTER OCMA DATA

	Mix 1
Sand	Wedron 410
Sand Additive %	-
Sand Additive	-
Lot #	-
Resin % & Ratio	1.20%, 50:50
Resin Part 1	Focus 109
Lot #	10/4/2024
Resin Part 2	Focus 209
Lot #	10/4/2024
Total Resin	36

	Weight (g)	Incremental Wt. Loss (g)	Total Wt. Loss (g)
Before Mixing	4348.53	0.00	0.00
After Mixing	4348.36	0.17	0.17
At 30 Min	4348.31	0.05	0.22
1 Hour	4348.28	0.03	0.25
2 Hour	4348.21	0.07	0.32
3 Hour	4348.15	0.06	0.38
4 Hour	4348.11	0.04	0.42
5 Hour	4348.07	0.04	0.46
6 Hour	4348.04	0.03	0.49
7 Hour	4348.00	0.04	0.53
8 Hour	4347.91	0.09	0.62
9 Hour	4347.93	-0.02	0.60
10 Hour	4347.86	0.07	0.67
11 Hour	4347.87	-0.01	0.66
12 Hour	4347.84	0.03	0.69
13 Hour	4347.81	0.03	0.72
14 Hour	4347.77	0.04	0.76
15 Hour	4347.75	0.02	0.78
16 Hour	4347.72	0.03	0.81
17 Hour	4347.70	0.02	0.83
18 Hour	4347.66	0.04	0.87
19 Hour	4347.65	0.01	0.88
20 Hour	4347.60	0.05	0.93
21 Hour	4347.59	0.01	0.94
22 Hour	4347.55	0.04	0.98
23 Hour	4347.54	0.01	0.99
24 Hour	4347.51	0.03	1.02
	24HR Wt. Loss (g.) due to Volatiles	1.02	
	24 HR Pound Volatile loss/Ton Sand	0.68	
	24 HR Pound Volatile loss/Pound Binder	0.0283	

ASKCHEMICALS


24 Hour OCMA Total Weight Loss
Focus 109/209 at 1.20% Binder, 50:50 Ratio on Wedron 410 Sand
Total Weight Loss in Grams (g)
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Before...
After...
At 30 Min
1 Hour
2 Hour
3 Hour
4 Hour
5 Hour
6 Hour
7 Hour
8 Hour
9 Hour
10 Hour
11 Hour
12 Hour
13 Hour
14 Hour
15 Hour
16 Hour
17 Hour
18 Hour
19 Hour
20 Hour
21 Hour
22 Hour
23 Hour
24 Hour
Focus 109/209, 1.20% BOS

Appendix W
2023 Response to DAQ Request for Information

January 12, 2023

Michelle McCloskey
Department of Environmental Protection
Division for Air Quality
300 Sower Boulevard
Frankfort, Kentucky 40601

Subject:PSD Construction Permit/Title V Operating Permit Application
Fritz Winter North America, LP
Source ID: 21-213-00064
Agency Interest: 129745
Activity: APE20220003
Permit: V-16-022-R1

Dear Michelle McCloskey:
Please find the following response to the Division for Air Quality (DAQ) information request dated August 31, 2022.

Emission Calculations

1. Form DEP7007N states that the emission calculations are provided in the emission calculations portion of the permit application. The following information in Appendix C of the submitted permit application must be submitted for form DEP7007N to be deemed complete:

   a. For pages *174, 180, 182, 184, 186, 190, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211,213, 215, 217, 219, 221, 223, 225, 233, 235, 237, 239, 245, 247, 249, 251, 253, 255, 259,261, 263, 284, & 286* of the submitted permit application:

      i. Control efficiencies for each controlled pollutant.

Response:

As explained below, control efficiencies are not used to calculate stack emissions of any pollutant [in this air permit application or in prior air permit applications], excluding the control of amine catalyst used at the PUCB Core Machines #1-#4 (EU39-EU42).

Filterable particulate matter (including PM_{10} and $PM_{2.5}$) air pollution control devices (APCDs) identified in the application include bin vent fabric filters (for silos), booth filters (for the paint lines), cartridge collectors (for Machining and Perforation Lines), other fabric filters (for the two snag grinders) and baghouses. See Attachment #1 that includes revised Tables 2-2 and 2-3 [Perforation Line #1 (EU84) has been added] that are provided on page 92 and 93, respectively of the air permit application for emission unit air pollution control device assignments.

The other APCD type identified in the application is an Acid Scrubber (CU07) for the control of the amine catalyst used in the phenolic urethane cold box (PUCB) core making process (PUCB Core Machine #1-#4, EU39-EU42). For the Acid Scrubber (CU07), a 98% control efficiency for the amine catalyst is included in the emission factor used to quantify VOC emissions. [See response to comment 8 below]

To calculate controlled PM, PM_{10} and $PM_{2.5}$ emissions (i.e., stack emissions), the application uses the same methodology as the original application. The APCD air volume (in acfm) and BACT-established outlet grain loadings (in gr/dscf) along with the stack temperature are used to determine hourly [Eq. 1] and annual [Eq. 2] stack emission rates from each control device. [differences in standard to actual barometric pressure and moisture content are negligible and therefore ignored]. Again Tables 2-2 and 2-3 identify the emission unit air pollution control assignments.

$$\boldsymbol{PM}\ \left(\frac{\boldsymbol{lb}}{\boldsymbol{hr}}\right) = \frac{\boldsymbol{gr}}{\boldsymbol{dscf}} \times \boldsymbol{acfm}\ \times (\mathbf{460}^{\circ}\mathrm{F} + \mathbf{70}^{\circ}\mathrm{F})/(\mathbf{460}^{\circ}\mathrm{F} + \boldsymbol{stack\ temp}^{\circ}\mathrm{F})$$ **[Eq. 1]**

$$\boldsymbol{PM}\ (\boldsymbol{tpy}) = \boldsymbol{PM}\ \left(\frac{\boldsymbol{lb}}{\boldsymbol{hr}}\right) \times \frac{\boldsymbol{hours}}{\boldsymbol{year}}$$ **[Eq. 2]**

Using an emission factor and an APCD control efficiency to quantify stack particulate emissions would not be appropriate as inlet conditions (inlet mass emissions, moisture content, particle size, etc.) are unknown. To answer the question, provided the "BACT identified" outlet grain loading for each PM air pollution control device, one would expect <u>PM control efficiencies in the area of 99.5%</u>.

ii. Total emission rates for all emitted pollutants in lb/hr, and tons per year;

Response:

As provided in the original and initial air permit application revision, Attachment #2 provides lb/hr and tons per year emission rates using Eq. 1 and Eq. 2, the estimated air volume from each emissions unit and the BACT identified outlet grain loading.

The total lb/hr and tons/yr differ somewhat from the original application because the secondary capture and control of combustion emission sources are not considered [due to lack of design air volumes].

iii. Method of emission factor calculations.

Response:

Please see Eq. 1 and Eq. 2 as well as the notes at the bottom of each worksheet. See Attachment #2.

b. Some of the current emission units have been updated to include additional pollutants, or updated emission factors. Please provide the basis for new emission factors for each applicable pollutant emitted from the following emission units located in Appendix C:
   i. EUs 07, 08, 09, 10, 13, 17, 19, 20, 21, 33, 39, 40, 41, 42, 45, 35A, 35B, 36 50, 51, 52,53, 57, 59, 60, 61, 62, 63, 64, 65, 66, & 84.

Response:

<u>Overall</u> – As PM, PM_{10} and $PM_{2.5}$ BACT are established for each APCD, it is beneficial to review the total emission rates at the control device level, therefore please see the emission rates for each control device as provided in the air permit application. Emission unit specific PM emission rates in Attachment #2 are provided only to illustrate compliance with 401 KAR 59:010, Section 3(2).

In addition to the above, this response assumes EU67 (Perforation Line #2) in lieu of the above comment-identified EU84 (Perforation Line #1) [which is addressed in a subsequent application].

<u>Induction Furnace #1 (EU07)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 178 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Induction Furnace #2 (EU08)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 180 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Induction Furnace #3 (EU09)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 182 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Induction Furnace #4 (EU10)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 184 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Hot Metal Transfer (EU13)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air

pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Melt and Core/Mold Baghouse Waste Dust Silo (EU17)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

<u>Mold Silica Sand Silo (EU19)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

<u>Blend Silo (EU20)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

<u>Bentonite Silo (EU21)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

<u>Mold Making #1 (EU33)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>PUCB Core Machine #1 (EU39) -</u> See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and acid scrubber air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The acid scrubber air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note:

Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

VOC emission rates for each PUCB Core Machine is determined based on the use of resin and catalyst; and then VOC emissions related to the use of core release. See the response to 8. for detail regarding the emission factors used.

<u>PUCB Core Machine #2 (EU40) -</u> See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and acid scrubber air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The acid scrubber air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

VOC emission rates for each PUCB Core Machine is determined based on the use of resin and catalyst; and then VOC emissions related to the use of core release. See the response to 8. for detail regarding the emission factors used.

<u>PUCB Core Machine #3 (EU41) -</u> See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and acid scrubber air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The acid scrubber air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

VOC emission rates for each PUCB Core Machine is determined based on the use of resin and catalyst; and then VOC emissions related to the use of core release. See the response to 8. for detail regarding the emission factors used.

<u>PUCB Core Machine #4 (EU42) -</u> See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and acid scrubber air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The acid scrubber air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

VOC emission rates for each PUCB Core Machine is determined based on the use of resin and catalyst; and then VOC emissions related to the use of core release. See the response to 8. for detail regarding the emission factors used.

<u>Core Dryer #2 (EU45)</u> – Provided the buildings are under negative pressure, it is assumed any combustion related PM, PM_{10} and $PM_{2.5}$ emissions are secondarily captured by an exhaust

point subsequently routed to a baghouse. See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments.

See the notes at the bottom of the worksheet on page 229 of the application for the basis of non-PM emission rates.

<u>Core Silica Sand Silo A (EU35A)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

<u>Core Silica Sand Silo B (EU35B)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

<u>Core Sand Handling and Preparation (EU36)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Pouring #1 (EU50)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 233 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Pouring #2 (EU51)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 235 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

Mold Cooling (EU52) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 237 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

Shakeout Conveyor (EU53) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). See the notes on page 239 of the permit application for the emission factor basis for the other pollutants of concern. [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

Sand Plant Baghouse Waste Dust Silo (EU57) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

Casting Cooling (EU59) – – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

Sorting Conveyor (EU60) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

Steel Shot Blasting #1 (EU61) – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application

revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Steel Shot Blasting #2 (EU62)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Fettling Baghouse Waste Dust Silo (EU63)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations.

<u>Auto Grinding #1 (EU64)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Auto Grinding #2 (EU65)</u> – See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and baghouse air volume are used to determine the collective emission rates for all emission units exhausted to the particular air pollution control device. The baghouse air volume is then distributed to each emission unit to determine individual unit PM, PM_{10} and $PM_{2.5}$ emission rates). [Note: Provided PM, PM_{10} and $PM_{2.5}$ emission factors are not used as fugitive emissions are not quantified given the buildings are under negative pressure.]

<u>Machining Lines (EU66)</u> - See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and cartridge collector air volume are used to determine the emission rate. See Tables 2-2 and 2-3 provided in the air permit application for emission unit air pollution control device assignments. See page 320 of the air permit application for quantification of the emissions.

<u>Perforation Line #2 (EU67)</u> - See Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and cartridge collector air volume are used to determine the emission rate.

This unit was installed following submittal of the air permit application that is the subject of this response. Please see the permit application for the emission calculation methodology.

2. Form DEP7007GG states that the control efficiencies of the control units operate with a control efficiency greater than or equal to 99%. Form DEP7007N states that the estimated control efficiency for each control device is greater than or equal to 99.5%. According to the Kentucky emission inventory system, each control device has a different control efficiency, often less than 99%. In order for forms DEP7007GG to be deemed complete and accurate, all control equipment information should be included in the form DEP7007GG.

    a. Please update page 884 of the permit application, the form needs to be completed for all control devices, and all boxes should be completed.

Response:

Attachment #3 includes the updated DEP7007GG that changes the pollutant removal % from 99 to 99.5+ to match Form DEP7007N for the fabric filters.

3. For EUs 19, 20, 21, 35A, 35B, 57, and 63:

    a. Please confirm that there is no condensable particulate expected from each emission unit where the application identifies that PM is assumed to be equal to PM2.5 and PM10.

Response:

The Mold Silica Sand Silo (EU19), Blend Silo (EU20), Bentonite Silo (EU21), Core Silica Sand Silo A (EU35A) and Core Silica Sand Silo B (EU35B) receive virgin solid material pneumatically conveyed from trucks. Temperatures are ambient and no condensable particulate matter is expected.

The Sand Plant Baghouse Waste Dust Silo (EU57) and Fettling Baghouse Waste Dust Silo (EU63) are receiving solid material (baghouse dust from CU06 and CU11) at ambient conditions. No condensable particulate matter is expected.

    b. Are the provided emission factors from Ohio EPA RACM pre or post-control emission factors? Any additional documentation should be provided.

Response:

See above response to b. regarding the emission calculation methodology for these emission units. In summary, see Eq.1 and 2 for PM, PM_{10} and $PM_{2.5}$ emission calculation methodology (this methodology is identical to that identified in the original and 1st application revision whereby the BACT identified outlet grain loading and bin vent fabric filter air volume are used to determine emission rates). See Tables 2-2 and 2-3 in Attachment #1 for emission unit air pollution control device assignments and the individual fabric filter bin vent worksheet for emission rate calculations. As the processes are enclosed there are no fugitive emissions identified.

The identified emission factors are provided only in the event it is necessary to quantify fugitive emissions.

The emission factors from Ohio EPA RACM are pre-controls. The foundry and cement (silo)-specific sections of Ohio EPA RACM is provided as Attachment #4.

4. For EUs 33, 34, and 43:

    a. Why was stack test data emission factors not used for the emission units, rather than the provided emission factors from Ohio RACM, Table 2.7-1.

Response:

Mold Making #1 (EU33) and Mold Making #2 (EU34) have either no or limited amounts of particulate matter. As indicated on the emission calculation sheet, any emissions from these operations would be captured by the Core/Mold Baghouse (CU08). Emission factors are only provided in the event fugitive emissions are to be quantified. Eq. 1 and Eq. 2 are used to determine emission rates in lb/hr and tpy at both the APCD and emission unit level (as provided in Attachment #2).

Core Wash Station #1 (EU43) emissions are associated with the VOC content of the wash. VOC emissions are determined based on a mass balance of the wash VOC content.

    b. Please confirm that there is no condensable particulate expected from each emission unit where PM is equal to PM2.5 and PM10.

Response:

For Mold Making #1 (EU33) and Mold Making #2 (EU34), these operations process prepared green sand into molds. The molds are prepared solid material at ambient temperature and are therefore not expected to have condensable particulate matter.

As shown in Table 2-2 and 2-3, emissions are secondarily captured by the identified air pollution control device. Condensable particulate matter are quantified for all operations at the control device stack [where the condensable matter is measured and where compliance with the BACT emission limits are demonstrated].

Core Wash Station #1 (EU43) emissions are only associated with the evaporative VOCs from the wash. No filterable or condensable particulate emissions are expected from the operation.

    c. Are the provided emission factors from Ohio EPA RACM pre or post-control emission factors? Again, additional documentation thereof would be useful.

Response:

As discussed above, the convention of the current Air Permit, the emissions from these operations are estimated based on BACT/outlet grain loadings and air volumes [see Eq. 1 and Eq. 2]. The emission factors provided are only provided in the event it is necessary to provide fugitive emission calculations.

The emission factors from Ohio EPA RACM are pre-controls. The foundry- and cement (silo)-specific section of Ohio EPA RACM has been provided as Attachment #4.

5. Please provide emission factors for both breathing and working losses along with the already provided Diesel Storage Tank properties on page 283 of the permit application for EU 75.

Response:

As TANKS emissions Estimation Software is no longer supported by USEPA, as recommended by USEPA, the equations and algorithms specified in AP-42 Chapter 7 is used for estimating VOC emissions from the Diesel Storage Tank (EU75). Breathing losses are estimated at 0.2551 lb VOC/year per 24,000 gallons or 0.011 lb VOC/1,000 gallons. Working losses are determined to be 137.3876 lb VOC/year or 5.724 lb VOC/1,000 gallons.

6. For EUs 79, 80, 81, and 82 VOC emission factors listed in Appendix C, please correct the emission factor to lb/ton.

Response:

[Aside: Likely Core Wash Station #1 (EU43) should be identified in this comment]

VOC emissions from Core Wash Station #1 (EU43), Core Wash Station #2 (EU79), Core Wash Station #3 (EU80), Core Wash Station #4 (EU81) and Rust Prohibitive (EU82) are based on the weight of material used in "tons/hr" (based on hourly usage capacity) and "tons/year" (based on an annual usage limit restriction) and the VOC content of the material. As indicated on the emission calculation worksheets, the emission factor is provided in "% by wt." The hourly and annual VOC emissions are determined by multiplying the usage weight (in tons/hr and tons/year) by the % by weight VOC.

7. For each unit's HAP emission calculation sheet in Appendix C, please include an emission factor for every potential HAP for each corresponding emission unit. If no HAPs are expected, please do not include a HAP emission calculation sheet, instead, provide information regarding the reason HAPs are not expected.

Response:

To determine the emissions of inorganic HAP/TAC emissions, baghouse dust analysis is to quantify the emissions of HAPs/TACs from all types of fabric filters (i.e., baghouses, cartridge collectors, etc.). Please reference Table 2-2 and 2-3 for the particular particulate matter control device and associated inorganic HAP emissions.

Other HAP emissions are either grouped (e.g., pouring, cooling and shakeout) to improve accuracy or provided at the emission unit level.

Rather than address workbook formatting issues, Attachment #5 provides a basis for the identification of HAPs from a specific operation.

8. The Division's current emissions inventory lists three process IDs for each of EUs 39, 40, 41, and 42: 1000 ft3 catalyst processed, Pounds Release Processed, and Pounds Binder Processed. However, the submitted application does not include the VOCs from the binder processed. Please clarify the absence of the VOC from the binder processing in the application. With your response, please provide detailed calculations for the new VOC emission factor listed on pages 213, 217, 221 and 225 of the submitted permit application.

Response:

To quantify the VOC emissions from the PUCB Core Machines [PUCB Core Machine #1 (EU39), PUCB Core Machine #2 (EU40), PUCB Core Machine #3 (EU41) and PUCB Core Machine #4 (EU41)], the emissions from the binder system (resin and catalyst) and the emissions from the core release are quantified on separate worksheets [i.e., there are two worksheets per core machine). The emissions from the core release are determine using the maximum hourly and annual core release and the maximum VOC content (as identified by vendor provided information). This is documented on the core release worksheet.

Regarding the resin and catalyst VOC emission factor, the factor is the additive sum of the VOC emission rate for the resin plus the VOC emission rate for the catalyst.

The VOC emission factor for the resin is determined by the following:

0.65 lb/ton of sand (per VOC OCMA weight loss test)
125% (emission factor adjustment based on stack test results)
1.25/1 (adjustment to OCMA weight loss test to reflect the FW maximum resin usage of 1.25% divided by the resin usage during the OCMA weight loss test.
= 1.016 lb/ton of sand

The VOC emission factor for the catalyst is determined by the following:

2000 (lb/ton)
1.25% (resin% usage based on sand)
10% (catalyst % based on resin)
=2.5 lb catalyst per ton of sand
1-98% (acid scrubber 98% control efficiency of amine catalyst)
=0.05 lb/ton of sand

Total VOC emission factor for resin and catalyst is 1.016 + 0.05 = 1.066 lb/ton of sand

Permit Modifications

1. The Division may consider grouping emission units if the processes operate in sequence in a continuous manner. Otherwise, individual processes need to be in the permit application and identified separately, if there are requested changes or to update information. Please provide additional information to support combining emission units into the requested groups. According to the permit application the requested emission unit groups are as follows:

    a. On page 915 of the permit application, EU 01 will include EU 02;

Response:

Scrap Steel Storage (EU01) and Alloy Storage (EU02) are co-located under roof on the Northeast side of the plant. The request is that both EU01 and EU02 be combined into the Charge Handling emission unit EU01. The request to combine these emission units is being made due to an error in the original air permit application submitted to DAQ.

The "charge materials" include scrap, fluxes and alloys some of which are received in bulk containers. . The "charge material" are deposited (i.e., handled) into one of four charge

hoppers which carry the "charge" through roll-up doors to one of the four furnaces. The receiving and storage of all "charge materials" are addressed under the same SCC (30400315) for "charge handling." Should it be necessary to quantify the uncontrolled emissions for "charge handling", the emissions are determined based on the "tons metal charged" and not the scrap, flux or alloys received. The identification of the "Charge Handling" emission unit that includes the receipt and storage of scrap, flux and alloys is industry practice.

b. On page 916 of the permit application, EU 13 will include EU 14;

Response:

It is requested that Transport Ladle #1 (EU13) and Transport Ladle #2 (EU14) be combined into a single operation identified as Hot Metal Transfer (EU13) due to an error in the initial air permit application submitted to DAQ.

Emissions result from the transfer of molten metal from the induction furnaces to the pouring furnace. Due to abrasion and thermal degradation, the ladle refractory must be repaired. When a ladle is taken out of service due to degradation, a repaired ladle takes its place. Whether there is one, two or even three ladles, the uncontrolled emissions from Hot Metal Transfer would be calculated based on the molten metal transferred and not be whether the metal is transported by any particular ladle. The identification of the emission unit Hot Metal Transfer is industry practice.

c. On pages 917, 918 and 919 of the permit application, EU 22 will include EUs 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 48 and 49;

Response:

Please note there is no EU25 in the current air permit or in the most recent application. In addition to the above identified emission units, the current air permit application has requested the Sand Cooler (EU54), Used Mold and Core Sand Storage (EU55) and Sand Screening (EU56) be combined into a single emissions unit Mold Sand Handling and Preparation (EU22). This request is being made to correct the initial air permit application submitted to DAQ.

The Mold Silica Sand Bin (EU22), Blend Bin (EU23), Bentonite Bin (EU24), Mold Silica Sand Weigh Hopper (EU26), Blend Weigh Hopper (EU27), Bentonite Weigh Hopper (EU28), Dust Weigh Hopper (EU29), Green Sand Mixer #1 (EU30), Green Sand Mixer #2 (EU31), Green Sand Mixer #3 (EU32), Mold Assembly #1 (EU48), Mold Assembly #2 (EU49), have been requested to be combined into Sand Cooler (EU54), Used Mold and Core Sand Storage (EU55) and Sand Screening (EU56) be combined into a single emissions unit Mold Sand Handling and Preparation (EU22) and designated as EU22.

Mold Sand Handling and Preparation is a continuous operation, where sand is returned for preparation and then reuse by Mold Making #1 (EU33) or Mold Making #2 (EU34). Sand is transported between equipment via conveyors, elevators and gravity. The emission unit includes sand storage (in bins and hoppers), sand processing (through Screens, Coolers and Mixers) and subsequently reused as molding sand. The return sand is supplemented with new additions of silica sand, bentonite and a blend of generally carbonaceous materials to form

new molds as Mold Making #1 (EU33) and Mold Making #2 (EU34). Uncontrolled emissions for the equipment at large is identified under SCC 30400350, "Sand Grinding/Handling."

d. On page 18 of the permit application, EU 36 will include EUs 37 and 38; and

Response:

These 3 units, Sand Classifier (EU36), Silica Sand Bin (UE37) and Weigh Hopper (EU38) are combined into a single unit identified as Core Sand Handling and Preparation.

The units are a continuous operation. When sand is needed for core making, sand is automatically and pneumatically conveyed from Core Silica Sand Silo A (EU35A) or Core Silica Sand Silo B (EU35b) to the Sand Classifier for sizing. Once sized, the sand is gravity fed to the Sand Bin and then gravity fed to the Weigh Hopper prior to being discharged to a mixer where the weighed sand is mixed with resin.

The above identified units are stacked on top of each other above the core machine and are not necessarily identifiable from one another. The Weigh Hopper receives sand directly from the Sand Bin. Binder is added and mixed to be delivered to the Core Machine calling for sand (either Core Machine #1 or Core Machine #2).

e. On page 921 of the permit application, EU 66 will include EU 67.

Response:

While other portions of the air permit application is correct, Page 921 of the permit application should not have identified combining existing Machining Lines (EU66) and Perforation Line (EU67) into a single emission unit.

[Please note subsequent to submittal of this air permit application, a permit was received for Perforation Line #1 (EU84). FWNA would like to identify EU67 as Perforation Line #2.

2. Due to the volume of changes requested, to help with timely processing of the permitting action, the Division requests that a red-line mark-up copy of the permit be submitted with your reply.

Response:

See Attachment #6

3. Does the facility still require the alternate operating scenarios included in Section H of the permit, or can they be removed because the construction phases have been completed?

Response:

No, the alternative operating scenarios included in Section H of the permit can be removed. The existing air permit identified emission unit, Paint Booth #3 (EU70), is not included in this permit application. Please incorporate Alternate Scenario #1 into the main permit for Emission Units Paint Line #1 (EU71), Paint Line #2 (EU69) and Paint Line #3 (EU68).

Additional Information

1. On page 263 of the permit application and elsewhere, Perforation Line 1 is designated as EU67. However, in a recent minor revision dated February 21, 2022, EU 84 – Perforation Line #1 was added into the Division's inventory. Please clarify if the facility only wants to change the description of an existing designation for EU 67 – Drilling and Milling - would the process of EU 67 be different or the same as the recently applied for EU 84?

Response:
The installation of Performance Line #1 (EU84) was not known prior to the submittal of the air permit application that is the subject of this response. During preparation of the air permit application for EU84 it was determined that the line would be identified as Perforation Line #1 and that the appropriate name for EU67 was Perforation Line #2.

The current description of 8 turning lathe lines (EU66) and 2 milling and drilling lines (EU67) is confusing as both car lines (7) and truck lines (2) all perform lathing, milling and drilling operations with some parts going the additional step at Perforation line 2 (a drilling operation).

2. Are building vents 01A, 01B, 02A, and 02B still constructed/installed? If they are, how are emissions prevented from passing through; are the vents are closed, how are they sealed? Are there any other egress points for emissions within the enclosed spaces near the vents?

Response:

Building Vent 01A is installed in the Fettling area. Buidling Vent 01B is installed near the Charge Handling area. Building Vent 02A is installed near the center of the Machining Building. Building Vent 02B is not installed.

Building Vents 01A and 01B are not used and the louvers are closed as negative pressure is maintained in the Foundry Building.

Following the study of the ventilation in Machining Building as it pertains to the quality of our coating operations, a determination was made that Vent 02A would not be used and the louvers would remain closed.

Aside: There are two other vents installed in the Foundry Building. One Building Vent is near Building Vent 01A near the Charge Handling Area and the other is near the location of the Electric Induction Furnaces (EU07 – EU10). Neither are used and louvers are closed. Negative pressure is maintained in the Foundry.

3. Where does the facility store waste dust from the baghouses?

Response:

Both the Melt Baghouse (CU01) and Core/Mold Baghouse (CU08) pneumatically convey baghouse dust to Melt and Core/Mold Baghouse Waste Dust Silo (EU17); The Sand Plant Baghouse (CU06) pneumatically conveys sand to the Sand Plant Waste Sand Silo (EU57) and the Fettling Baghouse (CU11) pneumatically convey sand to Fettling Baghouse Waste Dust Silo (EU63). [Note: As identified above both the Melt Baghouse (CU01) and the Core/Mold Baghouse (CU08) transport to the same waste silo, Melt Waste Dust Silo (EU17)]

Please contact me at eddie.butler@fritzwinter.us or at (270) 813-4000 should you have any questions regarding the attached response.

Respectfully submitted,

Eddie Butler
EHS Manager

Attachment #1
Revised Application Tables 2-2 and 2-3

Source Inventory, Requested Emission Unit Changes and Installation Status
Fritz Winter North America LP
Franklin, KY

Emission Unit	Description	Requested Description Change	FWNA Comments
EU01	Scrap Steel Storage	Combine into single emission unit identified as Charge Handling (EU01)	
~~EU02~~	~~Alloy Storage~~		
~~EU03~~	~~Scrap Drying~~	~~No Change~~	This unit will not be installed
~~EU04~~	~~Scrap Cleaning~~	~~No Change~~	This unit will not be installed
EU05	Refractory Burner #1	No Change	
EU06	Refractory Burner #2	No Change	
EU07	Induction Furnace #1	No Change	
EU08	Induction Furnace #2	No Change	
EU09	Induction Furnace #3	No Change	
EU10	Induction Furnace #4	No Change	
~~EU11~~	~~Holding Furnace #1~~	~~No Change~~	This unit will not be installed
~~EU12~~	~~Holding Furnace #2~~	~~No Change~~	This unit will not be installed
EU13	Transport Ladle #1	Combine into a single emission unit identified as Hot Metal Transfer (EU13)	
~~EU14~~	~~Transport Ladle #2~~		
EU15	Pouring Furnace #1	No Change	This will be installed when demand volume dictates
EU16	Pouring Furnace #2	No Change	
EU17	Melt and Core/Mold Baghouse Waste Dust Silo	No Change	
EU18	Refractory Curing Mobile Burner	No Change	
EU19	Mold Silica Sand Silo	No Change	
EU20	Blend Silo	No Change	
EU21	Bentonite Silo	No Change	
EU22	Mold Silica Sand Bin	Combine into a single emission unit identified as Mold Sand Handling and Preparation(EU22)	
~~EU23~~	~~Blend Bin~~		
~~EU24~~	~~Bentonite Bin~~		
~~EU26~~	~~Mold Silica Sand Weigh Hopper~~		
~~EU27~~	~~Blend Weigh Hopper~~		
~~EU28~~	~~Bentonite Weigh Hopper~~		
~~EU29~~	~~Dust Weigh Hopper~~		
~~EU30~~	~~Green Sand Mixer #1~~		
~~EU31~~	~~Green Sand Mixer #2~~		
~~EU32~~	~~Green Sand Mixer #3~~		
EU33	Mold Stamping #1	Mold Making #1	
EU34	Mold Stamping #2	Mold Making #2	This will be installed when demand volume dictates
EU35A	Core Silica Sand Silo A	No Change	
EU35B	Core Silica Sand Silo B	No Change	
EU36	Sand Classifier	Combine into a single emission unit identified as Core Sand Handling and Preparation (EU36)	
~~EU37~~	~~Core Silica Sand Bin~~		
~~EU38~~	~~Core Silica Sand Weigh Hopper~~		
EU39	Core Machine #1	PUCB Core Machine #1	
EU40	Core Machine #2	PUCB Core Machine #2	
EU41	Core Machine #3	PUCB Core Machine #3	This will be installed when demand volume dictates
EU42	Core Machine #4	PUCB Core Machine #4	This will be installed when demand volume dictates
EU43	Core Removal	Core Wash Station #1	
EU44	Dryer #1	Core Dryer #1	

Source Inventory, Requested Emission Unit Changes and Installation Status
Fritz Winter North America LP
Franklin, KY

EU45	Dryer #2	Core Dryer #2	
EU46	Dryer #3	Core Dryer #3	This will be installed when demand volume dictates
EU47	Dryer #4	Core Dryer #4	This will be installed when demand volume dictates
~~EU48~~	~~Mold Assembly #1~~	Combine into Mold Making #1	
~~EU49~~	~~Mold Assembly #2~~	Combine into Mold Making #2	This will be installed when demand volume dictates
EU50	Pouring #1	No Change	
EU51	Pouring #2	No Change	This will be installed when demand volume dictates
EU52	Cooling Tunnel	Mold Cooling	
EU53	Shakeout Conveyor	No Change	
~~EU54~~	~~Sand Cooler~~	Combine into a single emission unit identified as Mold Sand Handling and Preparation (EU22)	
~~EU55~~	~~Used Mold & Core Sand Storage~~	Combine into a single emission unit identified as Mold Sand Handling and Preparation (EU22)	
~~EU56~~	~~Sand Screening~~	Combine into a single emission unit identified as Mold Sand Handling and Preparation (EU22)	
EU57	Sand Plant Baghouse Waste Dust Silo	No Change	
~~EU58~~	~~Mold Shop Baghouse Waste Dust Silo~~	~~No Change~~	This unit will not be installed
EU59	Forced Air Cooler	Casting Cooling	
EU60	Sorting	Sorting Conveyor	
EU61	Steel Shot Blasting #1	No Change	
EU62	Steel Shot Blasting #2	No Change	This will be installed when demand volume dictates
EU63	Fettling Baghouse Waste Dust Silo	No Change	
EU64	Grinding #1	Auto Grinding #1	
EU65	Grinding #2	Auto Grinding #2	
EU66	Turning Lathes (8)	Machining (9)	
EU67	Drilling & Milling (2)	Perforation Line #2	
EU68	Paint Booth #1	Paint Line #3	
EU69	Paint Booth #2	Paint Line #2	
~~EU70~~	~~Paint Booth #3~~	~~Paint Line #4~~	This unit will not be installed
EU71	Paint Booth #4	Paint Line #1	
EU72	Emergency Generator #1	No Change	
EU73	Emergency Generator #2	No Change	
EU74	Emergency Generator #3	No Change	
~~EU75~~	~~Gasoline Storage Tank~~	~~No Change~~	This unit will not be installed
EU75	Diesel Storage Tank	No Change	
EU76	Paved Roads	No Change	
EU77	Snag Grinder #1	Addition	Emission unit may not be identified in existing Air Permit.
EU78	Snag Grinder #2	Addition	Emission unit may not be identified in existing Air Permit.
EU79	Core Wash Station #2	Addition	Included in existing air permit as EU43 but broken out as it functions as a discrete emission unit.
EU80	Core Wash Station #3	Addition	Included in existing air permit as EU43 but broken out as it functions as a discrete emission unit. Will be added as demand requires
EU81	Core Wash Station #4	Addition	Included in existing air permit as EU43 but broken out as it functions as a discrete emission unit. Will be added as demand requires
EU82	Rust Preventative Application	Addition	Emission unit may not be identified in existing Air Permit.

LEGEND

Installed but likely not addressed in existing air permit

Included in existing air permit but emission unit is not installed at this time. Permit, rules and guidance will be consulted to insure air permit provides authorization for installation

Control Device ID	Stack ID	Control Device and Stack Description	Emission Unit #1	Emission Unit #2	Emission Unit #3	Emission Unit #4	Emission Unit #5	Emission Unit #6	Emission Unit #7	Emission Unit #8	Emission Unit #9	Emission Unit #10	Emission Unit #11	Emission Unit #12	Emission Unit #13	Emission Unit #14	Emission Unit #15	Emission Unit #16	Emission Unit #17	Emission Unit #18	Emission Unit #19	Emission Unit #20
CU01	ST02	Melt Baghouse	EU01	EU02	~~EU03~~	~~EU04~~	EU05	EU06	EU07	EU08	EU09	EU10	~~EU11~~	~~EU12~~	EU13	EU14	EU15	EU16	EU18			
CU02	ST03	Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent	EU17																			
CU03	ST04	Mold Silica Sand Silo Bin Vent Filter	EU19																			
CU04	ST05	Blend Silo Bin Vent Filter	EU20																			
CU05	ST06	Bentonite Silo Bin Vent Filter	EU21																			
CU06	ST07	Sand Plant Baghouse	EU22	EU23	EU24	EU26	EU27	EU28	EU29	EU30	EU31	EU32	EU53	EU54	EU55	EU56						
CU07	ST08	Acid Scrubber	EU39	EU40	EU41	EU42																
CU08	ST09	Core/Mold Baghouse	EU33	EU34	EU36	EU37	EU38	EU43	EU44	EU45	EU46	EU47	EU48	EU49	EU50	EU51	EU52	EU59	EU79	EU80	EU81	EU83
~~CU09~~	~~ST10~~	~~Core/Mold Baghouse Waste Dust Silo Bin Vent Filter~~	~~EU58~~																			
CU10	ST11	Sand Plant Baghouse Waste Sand Silo Bin Vent Filter	EU57																			
CU11	ST12	Fettling Baghouse	EU60	EU61	EU62	EU64	EU65	EU83														
CU12	ST13	Fettling Baghouse Waste Dust Silo Bin Vent Filter	EU63																			
CU13a-CU13h	ST16	Machining Lines Cartridge Collectors	EU66																			
CU13i-CU13j	ST16	Perforation Line #2 Cartridge Collector	EU67																			
CU14	ST15A	Paint Line #3 Booth Filter	EU68																			
CU15	ST15B	Paint Line #2 Booth Filter	EU69																			
CU16	ST15C	~~Paint Line #4 Booth Filter~~	~~EU70~~																			
CU17	ST16	Paint Line #1 Booth Filter	EU71	EU82																		
CU19	ST09	Core Silica Sand Silo A Bin Vent Filter	EU35A																			
CU20	ST09	Core Silica Sand Silo B Bin Vent Filter	EU35B																			
NA	STG1	Emergency Generator #1	EU72																			
NA	STG2	Emergency Generator #2	EU73																			
NA	STG3	Emergency Generator #3	EU74																			
NA	STTK1	~~Gasoline Storage Tank Vent~~	~~EU75~~																			
NA	STTK1	Diesel Storage Tank Vent	EU75																			
NA	FUG	Paved Roadways	EU76																			
CU21	ST12	Snag Grinder #1 Fabric Filter	EU77																			
CU22	ST12	Snag Grinder #2 Fabric Filter	EU78																			
CU23	ST16	Perforation Line #1 Cartridge Collector	EU84																			

	Denotes secondary capture of emissions
	Denotes emissions from control device are captured and vented out an alternative control device stack
	Denotes emission unit is combined with another existing emission unit with CY2021 air permit application
	Denotes emission unit, air pollution control device and/or stack are not installed at time of permit application
	Denotes emission unit, air pollution control device and/or stack are not installed at time of permit application and will be combined with another unit
	Denotes secondary capture of emissions and emission unit is combined with another existing emission unit with CY2021 air permit application
~~strikethrough~~	Denotes emission unit, air pollution control device and/or stack will not be installed

Control Device ID	Stack ID	Control Device and Stack Description	Emission Unit #1	Emission Unit #2	Emission Unit #3	Emission Unit #4	Emission Unit #5	Emission Unit #6	Emission Unit #7	Emission Unit #8	Emission Unit #9	Emission Unit #10	Emission Unit #11	Emission Unit #12	Emission Unit #13	Emission Unit #14	Emission Unit #15	Emission Unit #16	Emission Unit #17	Emission Unit #18	Emission Unit #19	Emission Unit #20
CU01	ST02	Melt Baghouse	Scrap Steel Storage	Alloy Storage	~~Scrap Drying~~	~~Scrap Cleaning~~	Refractory Burner #1	Refractory Burner #2	Induction Furnace #1	Induction Furnace #2	Induction Furnace #3	Induction Furnace #4	~~Holding Furnace #1~~	~~Holding Furnace #2~~	Transport Ladle #1	Transport Ladle #2	Pouring Furnace #1	Pouring Furnace #2	Refractory Curing Mobile Burner			
CU02	ST03	Melt and Core/Mold Baghouse Waste Dust Silo Bin Vent	Melt and Core/Mold Baghouse Waste Dust Silo																			
CU03	ST04	Mold Silica Sand Silo Bin Vent Filter	Mold Silica Sand Silo																			
CU04	ST05	Blend Silo Bin Vent Filter	Blend Silo																			
CU05	ST06	Bentonite Silo Bin Vent Filter	Bentonite Silo																			
CU06	ST07	Sand Plant Baghouse	Mold Silica Sand Bin	Blend Bin	Bentonite Bin	Mold Silica Sand Weigh Hopper	Blend Weigh Hopper	Bentonite Weigh Hopper	Dust Weigh Hopper	Green Sand Mixer #1	Green Sand Mixer #2	Green Sand Mixer #3	Shakeout Conveyor	Sand Cooler	Used Mold & Core Sand Storage	Sand Screening						
CU07	ST08	Acid Scrubber	PUCB Core Machine #1	PUCB Core Machine #2	PUCB Core Machine #3	PUCB Core Machine #4																
CU08	ST09	Core/Mold Baghouse	Mold Making #1	Mold Making #2	Sand Classifier	Core Silica Sand Bin	Core Silica Sand Weigh Hopper	Core Wash Station #1	Core Dryer #1	Core Dryer #2	Core Dryer #3	Core Dryer #4	Mold Assembly #1	Mold Assembly #2	Pouring #1	Pouring #2	Mold Cooling	Casting Cooling	Core Wash Station #2	Core Wash Station #3	Core Wash Station #4	Rotary Sprue Cleaner and Return Conveyors
~~CU09~~	~~ST10~~	~~Core/Mold Baghouse Waste Dust Silo Bin Vent Filter~~	~~Mold Shop Baghouse Waste~~																			
CU10	ST11	Sand Plant Baghouse Waste Dust Silo Bin Vent Filter	Sand Plant Baghouse Waste																			
CU11	ST12	Fettling Baghouse	Sorting Conveyor	Steel Shot Blasting #1	Steel Shot Blasting #2	Auto Grinding #1	Auto Grinding #2	Rotary Sprue Cleaner and Return Conveyors														
CU12	ST13	Fettling Baghouse Waste Dust Silo Bin Vent Filter	Fettling Baghouse Waste Dust Silo																			
CU13a-CU13h	ST16	Machining Cartridge Collectors	Machining Lines (9)																			
CU13i-CU13j	ST16	Machining Cartridge Collectors	Perforation Line #2																			
CU14	ST15A	Paint Line #3 Booth Filter	Paint Line #3																			
CU15	ST15B	Paint Line #2 Booth Filter	Paint Line #2																			
~~CU16~~	~~ST15C~~	~~Paint Line #4 Booth Filter~~	~~Paint Line #4~~																			
CU17	ST16	Paint Line #1 Booth Filter	Paint Line #1	Rust Preventative Application																		
CU19	ST09	Core Silica Sand Silo A Bin Vent Filter	Core Silica Sand Silo A																			
CU20	ST09	Core Silica Sand Silo B Bin Vent Filter	Core Silica Sand Silo B																			
	STG1	Emergency Generator #1	Emergency Generator #1																			
	STG2	Emergency Generator #2	Emergency Generator #2																			
	STG3	Emergency Generator #3	Emergency Generator #3																			
	~~STTK-1~~	~~Gasoline Storage Tank Vent~~	~~Gasoline Storage Tank~~																			
	STTK-1	Diesel Storage Tank Vent	Diesel Storage Tank																			
	FUG	Paved Roadways	Paved Roadways																			
CU21	ST12	Snag Grinder #1 Fabric Filter	Snag Grinder #1																			
CU22	ST12	Snag Grinder #2 Fabric Filter	Snag Grinder #2																			
CU23	ST16	Perforation Line #1 Cartridge Collector	Perforation Line #1																			

Denotes secondary capture of emissions
Denotes emissions from control device are captured and vented out an alternative control device stack
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Denotes emission unit, air pollution control device and/or stack are not installed at time of permit application
Denotes emission unit, air pollution control device and/or stack are not installed at time of permit application and will be combined with another unit
~~strikethrough~~ Denotes emission unit, air pollution control device and/or stack will not be installed

Attachment #2
Emission Unit Level PM Calculations

Attachment #3
Revised DEP7007GG Form

Attachment #4
Ohio EPA RACM Sections

Attachment #5
HAP Justification

Attachment #6
Permit V-16-022 R1 Markup

Commonwealth of Kentucky
Energy and Environment Cabinet
Department for Environmental Protection
Division for Air Quality
300 Sower Boulevard
Frankfort, Kentucky 40601
(502) 564-3999

Final

AIR QUALITY PERMIT

Issued under 401 KAR 52:020

Permittee Name:	**Fritz Winter North America, LP**
Mailing Address:	**1 Fritz Winter Drive** **Franklin, Kentucky 42134**
Source Name:	**Fritz Winter North America, LP**
Mailing Address:	**1 Fritz Winter Drive** **Franklin, Kentucky 42134**
Source Location:	**Simpson County**
Permit:	**V-16-022 R2**
Agency Interest:	**129745**
Activity:	
Review Type:	**Title V / Title I – PSD Construction/Operating**
Source ID:	**21-213-00064**
Regional Office:	**Bowling Green Regional Office** **2642 Russellville Road** **Bowling Green, KY 42101** **(270) 746-7475**
County:	**Simpson**
Application Complete Date:	**July 11, 2016**
Issuance Date:	**October 24, 2016**
Revision Date:	
Expiration Date:	

Rick S. Shewekah for

Sean Alteri, Director
Division for Air Quality

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	Permit type	Activity#	Complete Date	Issuance Date	Summary of Action
V-16-022	**Initial**	**APE20160001**	**7/11/2016**	**10/24/2016**	**Initial Construction Permit**
V-16-022 R1	**Significant Revision**	**APE20160004**	**6/6/2017**	**11/25/2017**	**Revision to previously permitted PSD project**

SECTION A - PERMIT AUTHORIZATION

Pursuant to a duly submitted application the Kentucky Division for Air Quality (Division) hereby authorizes the operation of the equipment described herein in accordance with the terms and conditions of this permit. This permit has been issued under the provisions of Kentucky Revised Statutes (KRS) Chapter 224 and regulations promulgated pursuant thereto.

The permittee shall not construct, reconstruct, or modify any affected facilities without first submitting a complete application and receiving a permit for the planned activity from the permitting authority, except as provided in this permit or in 401 KAR 52:020, Title V Permits.

Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits, licenses, or approvals required by the Kentucky Energy and Environment Cabinet (Cabinet) or any other federal, state, or local agency.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS

Metal Melting Furnaces

Emission Group 01 – Melt Shop

Emission Unit 07 (EU07) Induction Furnace #1
Description:
Model: Junker – MFTGe Duomelt
Estimated Start of Construction: March 2017 Maximum
Throughput: 10 tons gray iron/hr
Controls: Baghouse (CU01)

Emission Unit 08 (EU08) Induction Furnace #2
Description:
Model: Junker – MFTGe Duomelt
Estimated Start of Construction: March 2017
Maximum Throughput: 10 tons gray iron/hr
Controls: Baghouse (CU01)

Emission Unit 09 (EU09) Induction Furnace #3
Description:
Model: Junker – MFTGe Duomelt Estimated
Start of Construction: July 2019 Maximum
Throughput: 10 tons gray iron/hr Controls:
Baghouse (CU01)

Emission Unit 10 (EU10) Induction Furnace #4
Description:
Model: Junker – MFTGe Duomelt
Estimated Start of Construction: July 2019
Maximum Throughput: 10 tons gray iron/hr
Controls: Baghouse (CU01)

Description: Four (4) electric induction furnaces that have a maximum short-term capacity of 10 tons gray iron/hr each, or 40 tons/hr combined.

APPLICABLE REGULATIONS:
401 KAR 51:017, Prevention of significant deterioration of air quality.
401 KAR 59:010, New process operations.
401 KAR 63:002, Section 2(4)(bbbbb) implementing **40 CFR 63, Subpart ZZZZZ,** *National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries Area Sources.*

1. **Operating Limitations:**
   a. The permittee shall comply with the pollution prevention management practices in 40 CFR 63.10885, the requirements in 40 CFR 63.10895(b) through (e), and the requirements in 40 CFR 63.10896 through 63.10900. [40 CFR 63.10895(a)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

b. The permittee shall operate a capture and collection system for each metal melting furnace. Each capture and collection system shall meet accepted engineering standards, such as those published by the American Conference of Governmental Industrial Hygienists. [40 CFR 63.10895(b)]

c. The permittee shall prepare and operate at all times according to a written operation and maintenance (O&M) plan for each control device for each induction furnace. The permittee shall maintain a copy of the O&M plan at the facility and make it available for review upon request. At a minimum, each plan shall contain the following information: [40 CFR 63.10896(a)]
   i. General facility and contact information; [40 CFR 63.10896(a)(1)]
   ii. Positions responsible for inspecting, maintaining, and repairing emissions control devices which are used to comply with 40 CFR 63, Subpart ZZZZZ; [40 CFR 63.10896(a)(2)]
   iii. Description of items, equipment, and conditions that will be inspected, including an inspection schedule for the items, equipment, and conditions. For baghouses that are equipped with bag leak detection systems, the O&M plan shall include the site-specific monitoring plan required in 40 CFR 63.10897(d)(2). [40 CFR 63.10896(a)(3)]
   iv. Identity and estimated quantity of the replacement parts that will be maintained in inventory; and [40 CFR 63.10896(a)(4)]
   v. Procedures for operating and maintaining a continuous parameter monitoring system (CPMS) in accordance with manufacturer's specifications. [40 CFR 63.10896(a)(5)]

d. The permittee may use any other O&M, preventative maintenance, or similar plan which addresses the requirements in 40 CFR 63.10896(a)(1) through (5) to demonstrate compliance with the requirements for an O&M plan. [40 CFR 63.10896(b)]

e. The permittee shall limit the operation of EU07, EU08, EU09, and EU10 to a combined maximum of 91,586 tons of gray iron processed per year, on a rolling 12-month basis. [401 KAR 51:017]

Compliance Demonstration Method:
Refer to **4. Specific Monitoring Requirements, 5. Specific Recordkeeping Requirements, 6. Specific Reporting Requirements,** and **7. Specific Control Equipment Operating Conditions.**

f. The permittee shall maintain the capture efficiency of each hood and exhaust pickup point serving EU07, EU08, EU09, and EU10 at or above 98% capture efficiency for PM, PM_{10}, and $PM_{2.5}$. [401 KAR 51:017]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Compliance Demonstration Method:
Compliance with **1. Operating Limitations (f)** and **(g)** shall be demonstrated by completing the testing in **3. Testing Requirements (l),** submitting the report required in **6. Specific Reporting Requirements (c),** and monitoring according to **7. Specific Control Requirements (d).**

2. Emission Limitations:

a. The permittee shall not discharge to the atmosphere emissions from any metal melting furnace or group of all metal melting furnaces that exceed 0.1 pounds of PM per ton of metal charged or 0.008 pounds of total metal HAP per ton of metal charged. [40 CFR 63.10895(c)(2)]

b. The permittee shall not discharge to the atmosphere fugitive emissions from foundry operations that exhibit opacity greater than 20 percent (6-minute average), except for one 6-minute average per hour that does not exceed 30 percent. [40 CFR 63.10895(e); 401 KAR 51:017]
   i. For the purposes of 40 CFR 63, Subpart ZZZZZ and the limit above: *Fugitive emissions* means any pollutant released to the atmosphere that is not discharged through a system of equipment that is specifically designed to capture pollutants at the source, convey them through ductwork, and exhaust them using forced ventilation. *Fugitive emissions* include pollutants released to the atmosphere through windows, doors, vents, or other building openings. *Fugitive emissions* also include pollutants released to the atmosphere through other general building ventilation or exhaust systems not specifically designed to capture pollutants at the source. [40 CFR 63.10906]

Compliance Demonstration Method:
Refer to **3. Testing Requirements, 4. Specific Monitoring Requirements, 5. Specific Recordkeeping Requirements, 6. Specific Reporting Requirements,** and **7. Specific Control Equipment Operating Conditions.**

c. The permittee shall not cause, suffer, allow, or permit any continuous (persisting more than 3 minutes) emission of particulate matter into the open air from a control device or stack associated with any affected facility which is equal to or greater than twenty (20) percent opacity, as measured by U.S. EPA Reference Method 9. [401 KAR 59:010, Section 3(1)(a); 401 KAR 51:017]

Compliance Demonstration Method:
Refer to **4. Monitoring Requirements(d)** for opacity compliance demonstration.

d. For emissions from a control device or stack no person shall cause, suffer, allow or permit the emission into the open air of particulate matter from any affected facility which is in excess of the following: [401 KAR 59:010, Section 3(2)]
   i. For process weight rates of 0.50 ton/hr or less: 2.34 lb/hr
   ii. For process weight rates up to 30 tons/hr: $E_{PM_j} = 3.59P_j^{0.62}$

   Where:
   j = Emission Unit;

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

E'_{PM_j} = The allowable particulate emission rate for unit j in pounds/hour;
P_j = The average process weight rate in tons/hour

Compliance Demonstration Method:
Compliance with the hourly particulate emission limitations in 401 KAR 59:010, Section 3(2) is assumed when compliance with the limitations in **SECTION D(5)** is demonstrated.

e. Refer to **SECTION D** for group PSD limits for PM, PM_{10}, and $PM_{2.5}$, and source-wide HAP emission limitations.

3. Testing Requirements:

a.]

b. The permittee shall conduct subsequent performance tests to demonstrate compliance with all applicable PM or total metal HAP emissions limits in 40 CFR 63.10895(c) for a metal melting furnace or group of all metal melting furnaces no less frequently than every 5 years and each time the permittee elects to change an operating limit or make a process change likely to increase HAP emissions. [40 CFR 63.10898(b)]

c. The permittee shall conduct each performance test according to the requirements in 40 CFR 63.7(e)(1), Table 1 to 40 CFR 63, Subpart ZZZZZ, and 40 CFR 63.10898(d) through (g). [40 CFR 63.10898(c)]

d. To determine compliance with the applicable PM or total metal HAP emissions limit in 40 CFR 63.10895(c) for a metal melting furnace in a lb/ton of metal charged format, compute the process-weighted mass emissions (E_p) for each test run using Equation 1: [40 CFR 63.10898(d)]

$$E_p = \frac{C \times Q \times T}{P \times K}$$

(Equation 1)

Where:
E_p = Process-weighted mass emissions rate of PM or total metal HAP, pounds of PM or total metal HAP per ton (lb/ton) of metal charged;
C = Concentration of PM or total metal HAP measured during performance test run, grains per dry standard cubic foot (gr/dscf);
Q = Volumetric flow rate of exhaust gas, dry standard cubic feet per hour (dscf/hr);
T = Total time during a test run that a sample is withdrawn from the stack during melt production cycle, hr;
P = Total amount of metal charged during the test run, tons; and

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

K = Conversion factor, 7,000 grains per pound.

e. To determine compliance with an emissions limit for situations when multiple sources are controlled by a single control device, but only one source operates at a time or other situations that are not expressly considered in 40 CFR 63.10898(d) through (f), the permittee shall submit a site-specific test plan to the Division for approval according to the requirements in 40 CFR 63.7(c)(2) and (3). [40 CFR 63.10898(g)]

f. The permittee shall conduct each opacity test for fugitive emissions according to the requirements in 40 CFR 63.6(h)(5) and Table 1 to 40 CFR 63, Subpart ZZZZZ. [40 CFR 63.10898(h)]

g. The permittee shall conduct subsequent performance tests to demonstrate compliance with the opacity limit in 40 CFR 63.10895(e) no less frequently than every 6 months and each time a process change likely to increase fugitive emissions in made. [40 CFR 63.10898(i)]

h. In the performance test report, the permittee shall certify that the capture system operated normally during the performance test. [40 CFR 63.10898(j)]

i. For each metal melting furnace subject to a PM limit in 40 CFR 63.10895(c), the permittee shall: [40 CFR 63, Subpart ZZZZZ, Table 1(1)]
   i. Select sampling port locations and the number of traverse points in each stack or duct using EPA Method 1 or 1A (40 CFR part 60, appendix A). Sampling sites must be located at the outlet of the control device (or at the outlet of the emissions source if no control device is present) prior to any releases to the atmosphere. [40 CFR 63, Subpart ZZZZZ, Table 1(1)(a)]
   ii. Determine volumetric flow rate of the stack gas using Method 2, 2A, 2C, 2D, 2F, or 2G (40 CFR part 60, appendix A). [40 CFR 63, Subpart ZZZZZ, Table 1(1)(b)]
   iii. Determine dry molecular weight of the stack gas using EPA Method 3, 3A, or 3B (40 CFR part 60, appendix A). The permittee may also use as an alternative to EPA Method 3B (40 CFR part 60, appendix A), the manual method for measuring the oxygen, carbon dioxide, and carbon monoxide content of exhaust gas, ANSI/ASME PTC 19.10-1981, "Flue and Exhaust Gas Analyses" (incorporated by reference—see 40 CFR 63.14). [40 CFR 63, Subpart ZZZZZ, Table 1(1)(c)]
   iv. Measure moisture content of the stack gas using EPA Method 4 (40 CFR part 60, A). [40 CFR 63, Subpart ZZZZZ, Table 1(1)(d)]
   v. Determine PM concentration using EPA Method 5, 5B, 5D, 5F, or 5I, as applicable (40 CFR part 60, appendix A). [40 CFR 63, Subpart ZZZZZ, Table 1(1)(e)]
      1) Collect a minimum sample volume of 60 dscf of gas during each PM sampling run. The PM concentration is determined using only the front-half (probe rinse and filter) of the PM catch. [40 CFR 63, Subpart ZZZZZ, Table 1(1)(i)]
   vi. A minimum of three valid test runs are needed to comprise a PM performance test. [40 CFR 63, Subpart ZZZZZ, Table 1(1)(iii)]
   vii. Sample PM only during normal melt production conditions, which may include, but are not limited to the following operations: Charging, melting, alloying, refining, slagging, and tapping. [40 CFR 63, Subpart ZZZZZ, Table 1(1)(v)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

viii. Determine and record the total combined weight of tons of metal charged during the duration of each test run. The permittee shall compute the process-weighted mass emissions of PM according to Equation 1 of 40 CFR 63.10898(d) for an individual furnace. [40 CFR 63, Subpart ZZZZZ, Table 1(1)(vi)]

j. For fugitive emissions from buildings or structures housing any iron and steel foundry emissions sources subject to opacity limit in 40 CFR 63.10895(e), the permittee shall: [40 CFR 63, Subpart ZZZZZ, Table 1(2)]
   i. Using a certified observer, conduct each opacity test according to EPA Method 9 (40 CFR part 60, appendix A-4) and 40 CFR 63.6(h)(5). [40 CFR 63, Subpart ZZZZZ, Table 1(2)(a)]
      1) The certified observer may identify a limited number of openings or vents that appear to have the highest opacities and perform opacity observations on the identified openings or vents in lieu of performing observations for each opening or vent from the building or structure. Alternatively, a single opacity observation for the entire building or structure may be performed, if the fugitive release points afford such an observation. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(a)(i)]
      2) During testing intervals when PM performance tests are being conducted, conduct the opacity test such that the opacity observations are recorded during the PM performance tests. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(a)(ii)]
   ii. As alternative to Method 9 performance test, conduct visible emissions test by Method 22 (40 CFR part 60, appendix A-7). The test is successful if no visible emissions are observed for 90 percent of the readings over 1 hour. If VE is observed greater than 10 percent of the time over 1 hour, then the facility must conduct another performance test as soon as possible, but no later than 15 calendar days after the Method 22 test, using Method 9 (40 CFR part 60, appendix A-4). [40 CFR 63, Subpart ZZZZZ, Table 1(2)(b)]
      1) The observer may identify a limited number of openings or vents that appear to have the highest visible emissions and perform observations on the identified openings or vents in lieu of performing observations for each opening or vent from the building or structure. Alternatively, a single observation for the entire building or structure may be performed, if the fugitive release points afford such an observation. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(b)(i)]
      2) During testing intervals when PM performance tests are being conducted, conduct the visible emissions test such that the observations are recorded during the PM performance tests. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(b)(ii)]

k. Except as provided in 401 KAR 50:045, performance tests used to demonstrate compliance with 401 KAR 59:010, Section 3 shall be conducted according to the following methods. Kentucky Methods 50 and 150(F-1) and other methods are filed by reference in 401 KAR 50:015. [401 KAR 59:010, Section 4]
   i. Reference Method 5 for the emission rates of particulate matter and the associated moisture content. [401 KAR 59:010, Section 4(1)]
   ii. Reference Method 1 for sample and velocity traverses. [401 KAR 59:010, Section 4(2)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

iii. Reference Method 2 for velocity and volumetric flow rate. [401 KAR 59:010, Section 4(3)]
iv. Reference Method 3 for gas analysis. [401 KAR 59:010, Section 4(4)]
v. Reference Method 9 for opacity of continuous emissions. [401 KAR 59:010, Section 4(5)]
vi. For Reference Method 5, Reference Method 1 shall be used to select the sampling site and the number of traverse sampling points. The sampling time for each run shall be at least sixty (60) minutes and the minimum sample volume shall be 0.85 dscm (thirty (30) dscf) except that smaller sampling time or volumes, when necessitated by process variables or other factors, may be approved by the Cabinet. [401 KAR 59:010, Section 4(7)]

l. The permittee shall, within 180 days of permit issuance verify the direction of airflow through both the largest building wall opening closest to the process and the largest opening of each hood and exhaust pickup point, is inward using a smoke tube and the following procedures: [401 KAR 51:017]
   i. The direction of airflow shall be monitored for at least 1 hour, with checks made no more than 10 minutes apart.
   ii. The velocity pressure shall be monitored during the test.
m. Pursuant to 401 KAR 59:005, Section 2(2) and 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.

n. Refer to **SECTION D** for group testing requirements.

4. Specific Monitoring Requirements:

a. The permittee shall make monthly inspections of the equipment that is important to the performance of the total capture system (i.e., pressure sensors, dampers, and damper switches). This inspection shall include observations of the physical appearance of the equipment (e.g., presence of holes in the ductwork or hoods, flow constrictions caused by dents or accumulated dust in the ductwork, and fan erosion). The permittee shall repair any defect or deficiency in the capture system as soon as practicable, but no later than 90 days. The permittee shall record the date and results of each inspection and the date of repair of any defect or deficiency. [40 CFR 63.10897(e)]

b. In the event of an exceedance of an established emissions limitation (including an operating limit), the permittee shall restore operation of the emissions source (including the control device and associated capture system) to its normal or usual manner or operation as expeditiously as practicable in accordance with good air pollution control practices for minimizing emissions. The response shall include minimizing the period of any startup, shutdown or malfunction and taking any necessary corrective actions to

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

restore normal operation and prevent the likely recurrence of the exceedance. The permittee shall record the date and time correction action was initiated, the correction action taken, and the date corrective action was completed. [40 CFR 63.10897(g)]

c. For each emission unit listed above, the permittee shall monitor the following parameters:
   i. Monthly and 12-month rolling total hours of operation;
   ii. Monthly and 12-month rolling total throughput;

d. Refer to **SECTION E**.

5. Specific Recordkeeping Requirements:

a. In addition to the records required by 40 CFR 63.10(b)(2)(iii) and (vi) through (xiv) and (b)(3), the permittee shall keep records of the information specified in 40 CFR 63.10899(b)(1) through (13). [40 CFR 63.10899(b)]
   i. The permittee shall keep records of monthly metal melt production for each calendar year. [40 CFR 63.10899(b)(6)]
   ii. The permittee shall keep a copy of the operation and maintenance plan as required by 40 CFR 63.10896(a) and records that demonstrate compliance with plan requirements. [40 CFR 63.10899(b)(7)]
   iii. If emissions averaging is used, the permittee shall keep records of the monthly metal melting rate for each furnace at the iron and steel foundry, and records of the calculated pounds of PM or total metal HAP per ton of metal melted for the group of all metal melting furnaces required by 40 CFR 63.10897(h). [40 CFR 63.10899(b)(8)]
   iv. The permittee shall keep records for bag leak detection systems as follows: [40 CFR 63.10899(b)(9)]
      1) Records of the bag leak detection system output; [40 CFR 63.10899(b)(9)(i)]
      2) Records of bag leak detection system adjustments, including the date and time of the adjustment, the initial bag leak detection system settings, and the final bag leak detection system settings; and [40 CFR 63.10899(b)(9)(ii)]
      3) The date and time of all bag leak detection system alarms, and for each valid alarm, the time corrective action was initiated, the corrective action taken, and the date on which corrective action was completed. [40 CFR 63.10899(b)(9)(iii)]
   v. The permittee shall keep records of capture system inspections and repairs as required by 40 CFR 63.10897(e). [40 CFR 63.10899(b)(10)]
   vi. The permittee shall keep records demonstrating conformance with the specifications for the operation of CPMS as required by 40 CFR 63.10897(f). [40 CFR 63.10899(b)(11)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

vii. The permittee shall keep records of corrective action(s) for exceedances and excursions as required by 40 CFR 63.10897(g). [40 CFR 63.10899(b)(12)]

viii. The permittee shall record the results of each inspection and maintenance required by 40 CFR 63.10897(a) for PM control devices in a logbook (written or electronic format). The permittee shall keep the logbook onsite and make the logbook available to the Division upon request. The permittee shall keep records of the information specified in 40 CFR 63.10899(b)(13)(i) through (iii). [40 CFR 63.10899(b)(13)]

1) The date and time of each recorded action for a fabric filter, the results of each inspection, and the results of any maintenance performed on the bag filters. [40 CFR 63.10899(b)(13)(i)]

b. The permittee shall record the occurrence, duration, cause and any corrective action taken for any incident or malfunction that occurs that causes or might cause an exceedance of the particulate emission or opacity standard when an emission unit is in operation.

c. For each emission unit listed above, the permittee shall maintain records of the following:
   i. Monthly and 12-month rolling total hours of operation;
   ii. Monthly and 12-month rolling total throughput;
   iii. SDSs for all materials used.

d. The permittee shall maintain records of the calculations required in **SECTION D**.

6. Specific Reporting Requirements:

a. The permittee shall submit semiannual compliance reports to the Division according to the requirements in 40 CFR 63.10(e). The reports shall include, at a minimum, the following information as applicable: [40 CFR 63.10899(c)]
   i. Summary information on the number, duration, and cause (including unknown cause, if applicable) of excursions or exceedances, as applicable, and the corrective action taken; [40 CFR 63.10899(c)(1)]
   ii. Summary information on the number, duration, and cause (including unknown cause, if applicable) for monitor downtime incidents (other than downtime associated with zero and span or other calibration checks, if applicable); and [40 CFR 63.10899(c)(2)]
   iii. Summary information on any deviation from the pollution prevention management practices in 40 CFR 63.10885 and 63.10886 and the operation and maintenance requirements 40 CFR 63.10896 and the corrective action taken. [40 CFR 63.10899(c)(3)]

7. Specific Control Equipment Operating Conditions:

a. For all emission units listed above, the permittee shall install, calibrate, maintain and operate, according to manufacturer's specifications, fabric filters designed to achieve the BACT limits in **SECTION D(5)**. The permittee shall make these records of the manufacturer's specification for the fabric filters available for inspection by the Division. [401 KAR 51:017]

b. Refer to **SECTION E** for control device requirements pursuant to 40 CFR 63, Subpart ZZZZZ and 401 KAR 51:017.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

c. The permittee shall operate the control devices associated with each emission unit at all times that the emission unit is operating. [401 KAR 51:017]

d. For the baghouse associated with EU07, EU08, EU09, and EU10, the permittee shall continuously monitor the velocity pressure in the stack, and maintain it at 80% or above the level measured during the testing required by **3. Testing Requirements (l)**.

e. The permittee shall install, calibrate, maintain and operate, according to manufacturer's specifications (as applicable), a monitoring device (differential pressure gauges or manometers) to determine the pressure drop across each baghouse, at a minimum, once a day during the operation of the unit. A permanent label displaying the operating range established for each baghouse shall be posted next to the selected instrument. [401 KAR 51:017]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Foundry Operations

Emission Unit	Description	BACT Control Device	Maximum Hourly Capacity	PSD Operating Limitations	Maximum Burner Capacity	Estimated Start of Construction
Emission Group 01 – Melt Shop						
EU01	Scrap Steel Storage	None	25.3 ton gray iron/hr, each	91,586 ton gray iron/yr	N/A	August 2016
EU02	Alloy Storage	Baghouse (CU01)		91,586 ton gray iron/yr	N/A	August 2016
EU03	Scrap Drying	None		60.12 MMscf/yr	7 MMBtu/hr	August 2016
EU04	Scrap Cleaning	Baghouse (CU01)		91,586 ton gray iron/yr & 120.24 MMscf/yr	14 MMBtu/hr	August 2016
EU05	Refractory Burner #1	None	N/A	73 MMscf/yr	8.50 MMBtu/hr	August 2016
EU06	Refractory Burner #2	None	N/A	73 MMscf/yr	8.50 MMBtu/hr	March 2019
EU11	Holding Furnace #1	Baghouse (CU01)	12.7 ton gray iron/hr, each	45,793 ton gray iron/yr & 24.99 MMscf/yr	2.91 MMBtu/hr	August 2016
EU12	Holding Furnace #2			45,793 ton gray iron/yr & 24.99 MMscf/yr	2.91 MMBtu/hr	March 2019
EU13	Transport Ladle #1	None		45,793 ton gray iron/yr	N/A	August 2016
EU14	Transport Ladle #2	None		45,793 ton gray iron/yr	N/A	March 2019
EU15	Pouring Furnace #1	Baghouse (CU01)		45,793 ton gray iron/yr & 24.99 MMscf/yr	2.91 MMBtu/hr	August 2016
EU16	Pouring Furnace #2			45,793 ton gray iron/yr & 24.99 MMscf/yr	2.91 MMBtu/hr	March 2019
EU17	Melt Shop Baghouse Waste Dust Silo	Bin Vent Filter (CU02)	25.3 ton gray iron/hr	91,586 ton gray iron/yr	N/A	August 2016
EU18	Refractory Curing Mobile Burner	None	N/A	17.18 MMscf/yr	2.00 MMBtu/hr	August 2016
Emission Group 02 – Sand Plant						
EU19	Mold Silica Sand Silo	Bin Vent Filter (CU03)	197 ton mold sand/hr	711,986 ton mold sand/yr	N/A	August 2016

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Unit	Description	BACT Control Device	Maximum Hourly Capacity	PSD Operating Limitations	Maximum Burner Capacity	Estimated Start of Construction
EU20	Blend Silo	Bin Vent Filter (CU04)	1.15 ton blend/hr	4,179 ton blend/yr	N/A	August 2016
EU21	Bentonite Silo	Bin Vent Filter (CU05)	0.16 ton bentonite/hr	595 ton bentonite/yr	N/A	August 2016
EU22	Mold Silica Sand Bin	Baghouse (CU06)	197 ton mold sand/hr	711,986 ton mold sand/yr	N/A	August 2016
EU23	Blend Bin		1.15 ton blend/hr	4,179 ton blend/yr	N/A	August 2016
EU24	Bentonite Bin		0.16 ton bentonite/hr	595 ton bentonite/yr	N/A	August 2016
EU26	Mold Silica Sand Weigh Hopper		197 ton mold sand/hr	711,986 ton mold sand/yr	N/A	August 2016
EU27	Blend Weigh Hopper		1.15 ton blend/hr	4,179 ton blend/yr	N/A	August 2016
EU28	Bentonite Weigh Hopper		0.16 ton bentonite/hr	595 ton bentonite/ yr	N/A	August 2016
EU29	Dust Weigh Hopper		2.80 ton waste sand/hr	10,149 ton waste sand/yr	N/A	August 2016
EU30	Green Sand Mixer #1		66.0 ton green sand/hr, each	237,329 ton green sand/yr	N/A	August 2016
EU31	Green Sand Mixer #2			237,329 ton green sand/yr	N/A	August 2016
EU32	Green Sand Mixer #3			237,329 ton green sand/yr	N/A	March 2019
EU33	Mold Stamping #1	Baghouse (CU08)	99.0 ton green sand/hr, each	358,380 ton green sand/yr	N/A	August 2016
EU34	Mold Stamping #2			358,380 ton green sand/yr	N/A	March 2019
EU35A	Core Silica Sand Silo A	Bin Vent Filter (CU18)	1.85 ton core sand/hr, each	6,690 ton core sand/yr, each	N/A	August 2016
EU35B	Core Silica Sand Silo B	Bin Vent Filter (CU19)		6,690 ton core sand/yr, each	N/A	March 2019
EU36	Sand Classifier	Baghouse (CU08)	3.70 ton core sand/hr, each	13,380 ton core sand/yr	N/A	August 2016
EU37	Core Silica Sand Bin			13,380 ton core sand/yr	N/A	August 2016
EU38	Core Silica Sand Weigh Hopper			13,380 ton core sand/yr	N/A	August 2016

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Unit	Description	BACT Control Device	Maximum Hourly Capacity	PSD Operating Limitations	Maximum Burner Capacity	Estimated Start of Construction
EU39	Core Machine #1	Sulfuric Acid Scrubber (CU07)	1.98 lb amine gas/hr; 4.2 lb release agent/hr; 34 lb binder/ hr, each	3.58 ton amine gas/yr; 7.70 ton release agent/yr; 60.2 ton binder/yr	N/A	August 2016
EU40	Core Machine #2			3.58 ton amine gas/yr; 7.70 ton release agent/yr; 60.2 ton binder/yr	N/A	August 2016
EU41	Core Machine #3			3.58 ton amine gas/yr; 7.70 ton release agent/yr; 60.2 ton binder/yr	N/A	March 2019
EU42	Core Machine #4			3.58 ton amine gas/yr; 7.70 ton release agent/yr; 60.2 ton binder/yr	N/A	March 2019
EU43	Core Removal	Baghouse (CU08)	3.70 ton core sand/hr	13,380 ton core sand/yr	N/A	August 2016
EU44	Dryer #1		32 lb coating/hr; 34 lb binder/hr, each	34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	August 2016
EU45	Dryer #2			34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	August 2016
EU46	Dryer #3			34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	March 2019
EU47	Dryer #4			34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	March 2019
EU54	Sand Cooler	Baghouse (CU06)	194 ton recycled sand/hr, each	700,934 ton recycled sand/yr	N/A	August 2016
EU55	Used Mold & Core Sand Storage			700,934 ton recycled sand/yr	N/A	August 2016
EU56	Sand Screening		202 ton total used sand/hr, each	730,140 ton total used sand/yr	N/A	August 2016
EU57	Sand Plant Waste Sand Silo	Bin Vent Filter (CU10)		730,140 ton total used sand/yr	N/A	August 2016
Emission Group 03 – Casting & Molding						
EU48	Mold Assembly #1	Baghouse (CU08)	100.8 ton total used sand/hr, each	365,070 ton total used sand/yr	N/A	August 2016
EU49	Mold Assembly #2			365,070 ton total used sand/yr	N/A	March 2019

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Unit	Description	BACT Control Device	Maximum Hourly Capacity	PSD Operating Limitations	Maximum Burner Capacity	Estimated Start of Construction
EU50	Pouring #1	Baghouse (CU08)	12.7 ton gray iron/hr, each	45,793 ton gray iron/yr	N/A	August 2016
EU51	Pouring #2			45,793 ton gray iron/yr	N/A	March 2019
EU52	Cooling Tunnel		25.3 ton gray iron/hr, each	91,586 ton gray iron/yr & 8.59 MMscf/yr	1 MMBtu/hr	August 2016
EU53	Shakeout Conveyor	Baghouse (CU06)		91,586 ton gray iron/yr	N/A	August 2016
EU58	Mold Shop Baghouse Waste Dust Silo	Bin Vent Filter (CU09)		91,586 ton gray iron/yr	N/A	August 2016
EU59	Forced Air Cooler	Baghouse (CU08)		91,586 ton gray iron/yr	N/A	August 2016
Emission Group 04 – Fettling Shop						
EU60	Sorting	Baghouse (CU11)	25.3 ton gray iron/hr	91,586 ton gray iron/yr	N/A	August 2016
EU61	Steel Shot Blasting #1		4.40 lb shot/hr, each	15,928 lb shot/yr	N/A	August 2016
EU62	Steel Shot Blasting #2			15,928 lb shot/yr	N/A	March 2019
EU63	Fettling Baghouse Waste Dust Silo	Bin Vent Filter (CU12)	25.3 ton gray iron/hr	91,586 ton gray iron/yr	N/A	August 2016
EU64	Grinding #1	Baghouse (CU11)	12.7 ton gray iron/hr, each	45,793 ton gray iron/yr	N/A	August 2016
EU65	Grinding #2			45,793 ton gray iron/yr	N/A	March 2019
Emission Group 05 – Machining Shop						
EU66	Turning Lathes (8)	Cartridge Filters (CU13a thru h)	25.3 ton gray iron/hr, each	91,586 ton gray iron/yr	N/A	August 2016
EU67	Drilling & Milling (2)	Cartridge Filters (CU13i & j)		91,586 ton gray iron/yr	N/A	August 2016

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Description: The processes listed above are considered to meet the definition of Foundry Operations, as defined in 40 CFR 63.10906, which means all process equipment and practices used to produce metal castings for shipment, including: Mold or core making and coating; scrap handling and preheating; metal melting and inoculation; pouring, cooling, and shakeout; shotblasting, grinding, and other metal finishing operations; and sand handling.

APPLICABLE REGULATIONS:

401 KAR 51:017, Prevention of significant deterioration of air quality.

401 KAR 59:010, New process operations.

401 KAR 63:002, Section 2(4)(bbbbb) implementing **40 CFR 63, Subpart ZZZZZ,** *National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries Area Sources.*

1. **Operating Limitations:**
   a. For each segregated metallic scrap storage area, bin or pile, the permittee shall comply with the materials acquisition requirements in 40 CFR 63.10885(a)(1) or (2). The permittee shall keep a copy of the material specifications onsite and readily available to all personnel with material acquisition duties, and provide a copy to each of the scrap providers. The permittee may have certain scrap subject to 40 CFR 63.10885(a)(1) and other scrap subject to 40 CFR 63.10885(a)(2) at the facility provided the metallic scrap remains segregated until charge make-up. [40 CFR 63.10885(a)]
      i. The permittee shall prepare and operate at all times according to written material specifications for the purchase and use of only metal ingots, pig iron, slitter, or other materials that do not include post-consumer automotive body scrap, post-consumer engine blocks, post-consumer oil filters, oily turnings, lead components, chlorinated plastics, or free liquids. For the purpose of 40 CFR 63, Subpart ZZZZZ, "free liquids" is defined as material that fails the paint filter test by EPA Method 9095B, "Paint Filter Liquids Test" (revision 2), November 2004 (incorporated by reference—see 40 CFR 63.14). The requirements for no free liquids do not apply if the permittee can demonstrate that the free liquid is water that resulted from scrap exposure to rain. [40 CFR 63.10885(a)(1)]
      ii. The permittee shall prepare and operate at all times according to written material specifications for the purchase and use of only iron and steel scrap that has been depleted (to the extent practicable) of organics and HAP metals in the charge materials used by the iron and steel foundry. The materials specifications shall include at minimum the information specified in 40 CFR 63.10885(a)(2)(i). [40 CFR 63.10885(a)(2)]
         1) Specifications for metallic scrap materials charged to a scrap preheater or metal melting furnace to be depleted (to the extent practicable) of the presence of used oil filters, chlorinated plastic parts, accessible lead-containing components (such as batteries and wheel weights), and a program to ensure the scrap materials are drained of free liquids. [40 CFR 63.10885(a)(2)(i)]

   b. For scrap containing motor vehicle scrap, the permittee shall procure the scrap pursuant to one of the compliance options in 40 CFR 63.10885(b)(1), (2), or (3) for each scrap provider, contract, or shipment. For scrap that does not contain motor vehicle scrap, the permittee shall procure the scrap pursuant to the requirements in 40 CFR 63.10885(b)(4)

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

for each scrap provider, contract, or shipment. The permittee may have one scrap provider, contract, or shipment subject to one compliance provision and others subject to another compliance provision. [40 CFR 63.10885(b)]

i. Site-specific plan for mercury switches. The permittee shall comply with the requirements in 40 CFR 63.10885(b)(1)(i) through (v). [40 CFR 63.10885(b)(1)]
   1) The permittee shall include a requirement in the scrap specifications for removal of mercury switches from vehicle bodies used to make the scrap. [40 CFR 63.10885(b)(1)(i)]
   2) The permittee shall prepare and operate according to a plan demonstrating how the facility will implement the scrap specification in 40 CFR 63.10885(b)(1)(i) for removal of mercury switches. The permittee shall submit the plan to the Division for approval. The permittee shall operate according to the plan as submitted during the review and approval process, operate according to the approved plan at all times after approval, and address any deficiency identified by the Division within 60 days following disapproval of a plan. The permittee may request approval to revise the plan and may operate according to the revised plan unless and until the revision is disapproved by the Division. The Division may change the approval status of the plan upon 90-days written notice based upon the semiannual report or other information. The plan shall include: [40 CFR 63.10885(b)(1)(ii)]
      A. A means of communicating to scrap purchasers and scrap providers the need to obtain or provide motor vehicle scrap from which mercury switches have been removed and the need to ensure the proper management of the mercury switches removed from the scrap as required under the rules implementing subtitle C of the Resource Conservation and Recovery Act (RCRA) (40 CFR parts 261 through 265 and 268). The plan shall include documentation of direction to appropriate staff to communicate to suppliers throughout the scrap supply chain the need to promote the removal of mercury switches from end-of-life vehicles. Upon the request of the Division, the permittee shall provide examples of materials that are used for outreach to suppliers, such as letters, contract language, policies for purchasing agents, and scrap inspection protocols; [40 CFR 63.10885(b)(1)(ii)(A)]
      B. Provisions for obtaining assurance from scrap providers motor vehicle scrap provided to the facility meet the scrap specification; [40 CFR 63.10885(b)(1)(ii)(B)]
      C. Provisions for periodic inspections or other means of corroboration to ensure that scrap providers and dismantlers are implementing appropriate steps to minimize the presence of mercury switches in motor vehicle scrap and that the mercury switches removed are being properly managed, including the minimum frequency such means of corroboration will be implemented; and [40 CFR 63.10885(b)(1)(ii)(C)]
      D. Provisions for taking corrective actions (i.e., actions resulting in scrap providers removing a higher percentage of mercury switches or other mercury-containing components) if needed, based on the results of procedures implemented in 40 CFR 63.10885(b)(1)(ii)(C). [40 CFR 63.10885(b)(1)(ii)(D)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

3) The permittee shall require each motor vehicle scrap provider to provide an estimate of the number of mercury switches removed from motor vehicle scrap sent to the facility during the previous year and the basis for the estimate. The Division may request documentation or additional information at any time. [40 CFR 63.10885(b)(1)(iii)]
4) The permittee shall establish a goal for each scrap supplier to remove at least 80 percent of the mercury switches. Although a site-specific plan approved under 40 CFR 63.10885(b)(1) may require only the removal of convenience light switch mechanisms, the Division will credit all documented and verifiable mercury-containing components removed from motor vehicle scrap (such as sensors in anti-locking brake systems, security systems, active ride control, and other applications) when evaluating progress towards the 80 percent goal. [40 CFR 63.10885(b)(1)(iv)]
5) For each scrap provider, the permittee shall submit semiannual progress reports to the Division that provide the number of mercury switches removed or the weight of mercury recovered from the switches, the estimated number of vehicles processed, an estimate of the percent of mercury switches removed, and certification that the removed mercury switches were recycled at RCRA-permitted facilities or otherwise properly managed pursuant to RCRA subtitle C regulations referenced in 40 CFR 63.10885(b)(1)(ii)(A). This information can be submitted in aggregate form and does not have to be submitted for each shipment. The Division may change the approval status of a site-specific plan following 90-day's notice based on the progress reports or other information. [40 CFR 63.10885(b)(1)(v)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

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c. The permittee shall comply with the pollution prevention management practices in 40 CFR 63.10885 and 63.10886, the requirements in 40 CFR 63.10895(b) through (e), and the requirements in 40 CFR 63.10896 through 63.10900. [40 CFR 63.10895(a)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

d. The permittee shall prepare and operate at all times according to a written operation and maintenance (O&M) plan for each control device. The permittee shall maintain a copy of the O&M plan at the facility and make it available for review upon request. At a minimum, each plan shall contain the following information: [40 CFR 63.10896(a)]
   i. General facility and contact information; [40 CFR 63.10896(a)(1)]
   ii. Positions responsible for inspecting, maintaining, and repairing emissions control devices which are used to comply with 40 CFR 63, Subpart ZZZZZ; [40 CFR 63.10896(a)(2)]
   iii. Description of items, equipment, and conditions that will be inspected, including an inspection schedule for the items, equipment, and conditions. For baghouses that are equipped with bag leak detection systems, the O&M plan shall include the site-specific monitoring plan required in 40 CFR 63.10897(d)(2). [40 CFR 63.10896(a)(3)]
   iv. Identity and estimated quantity of the replacement parts that will be maintained in inventory; and [40 CFR 63.10896(a)(4)]
   v. Procedures for operating and maintaining a CPMS in accordance with manufacturer's specifications. [40 CFR 63.10896(a)(5)]

e. The permittee may use any other O&M, preventative maintenance, or similar plan which addresses the requirements in 40 CFR 63.10896(a)(1) through (5) to demonstrate compliance with the requirements for an O&M plan. [40 CFR 63.10896(b)]

f. The permittee shall not exceed the yearly operating limitations listed in the table above on a rolling 12-month basis. [401 KAR 51:017]

g. The permittee shall prepare and maintain for EU05, EU06, EU15, EU16, EU18, EU44, EU45, EU46, and EU47 within 90 days of startup, a good combustion and operation practices plan (GCOP) that defines, measures and verifies the use of operational and design practices determined as BACT for minimizing CO, VOC, PM, PM_{10}, and $PM_{2.5}$ emissions. Any revisions requested by the Division shall be made and the plan shall be maintained on site. The permittee shall operate according to the provisions of this plan at all times, including periods of startup, shutdown, and malfunction. The plan shall be incorporated into the plant standard operating procedures (SOP) and shall be made available for the Division's inspection. The plan shall include, but not be limited to: [401 KAR 51:017]
   i. A list of combustion optimization practices and a means of verifying the practices have occurred.
   ii. A list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred.
   iii. A list of the design choices determined to be BACT and verification that designs were implemented in the final construction.

Compliance Demonstration Method:
Refer to **4. Specific Monitoring Requirements**, **5. Specific Recordkeeping Requirements**, **6. Specific Reporting Requirements**, and **7. Specific Control Equipment Operating Conditions**.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

h. The permittee shall operate a capture and collection system for each emission unit listed above to maintain negative pressure in the foundry. Each capture and collection system employed shall meet accepted engineering standards, such as those published by the American Conference of Governmental Industrial Hygienists. [401 KAR 51:017]

Compliance Demonstration Method:
Compliance with **1. Operating Limitations (h)** and **(i)** shall be demonstrated by completing the testing in **3. Testing Requirements (i),** submitting the report required in **6. Specific Reporting Requirements (c),** and monitoring according to **7. Specific Control Reqirements (d).**

i. The permittee shall install a natural gas burners along the conveyor downstream of each pouring station (EU50 and EU51). These burners shall be oriented such that they ignite the vents of the mold assemblies in the event that they are not already burning. [401 KAR 51:017]

j. The permittee shall operate and maintain the BACT control devices identified in the table above at all times that any associated process vented to the control device is operating. [401 KAR 51:017]

2. Emission Limitations:

a. The permittee shall not discharge to the atmosphere fugitive emissions from foundry operations that exhibit opacity greater than 20 percent (6-minute average), except for one 6-minute average per hour that does not exceed 30 percent. [40 CFR 63.10895(e); 401 KAR 51:017]

i. For the purposes of 40 CFR 63, Subpart ZZZZZ and the limit above: *Fugitive emissions* means any pollutant released to the atmosphere that is not discharged through a system of equipment that is specifically designed to capture pollutants at the source, convey them through ductwork, and exhaust them using forced ventilation. *Fugitive emissions* include pollutants released to the atmosphere through windows, doors, vents, or other building openings. *Fugitive emissions* also include pollutants released to the atmosphere through other general building ventilation or exhaust systems not specifically designed to capture pollutants at the source. [40 CFR 63.10906]

Compliance Demonstration Method:
Refer to **3. Testing Requirements, 4. Specific Monitoring Requirements, 5. Specific Recordkeeping Requirements, 6. Specific Reporting Requirements,** and **7. Specific Control Equipment Operating Conditions.**

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

b. The permittee shall not cause, suffer, allow, or permit any continuous (persisting more than 3 minutes) emission of particulate matter into the open air from a control device or stack associated with any affected facility which is equal to or greater than twenty (20) percent opacity, as measured by U.S. EPA Reference Method 9. [401 KAR 59:010, Section 3(1)(a); 401 KAR 51:017]

Compliance Demonstration Method:
Refer to **4. Monitoring Requirements(d)** for opacity compliance demonstration.

c. For emissions from a control device or stack no person shall cause, suffer, allow or permit the emission into the open air of particulate matter from any affected facility which is in excess of the following: [401 KAR 59:010, Section 3(2)]

i. For process weight rates of 0.50 ton/hr or less: 2.34 lb/hr
ii. For process weight rates up to 30 tons/hr: $E'_{PM_j} = 3.59P_j^{0.62}$
iii. For process weight rates greater than 30 tons/hr: $E'_{PM_j} = 17.31P_j^{0.16}$

Where:
j = Emission Unit;
E'_{PM_j} = The allowable particulate emission rate for unit j in pounds/hour;
P_j = The average process weight rate in tons/hour

Compliance Demonstration Method:
Compliance with the hourly particulate emission limitations in 401 KAR 59:010, Section 3(2) is assumed when compliance with the limitations in **2. Emission Limitations(d)** and **SECTION D(5)** is demonstrated and natural gas is used as fuel for combustion sources.

d. The permittee shall not emit to the atmosphere total PM, PM_{10}, and $PM_{2.5}$ emissions greater than the following: [401 KAR 51:017]

Emission Unit	Description	BACT Control Device	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
Emission Group 01 – Melt Shop					
EU17	Melt and Core/Mold Baghouse Waste Dust Silo	Bin Vent Filter (CU02)	0.0030 gr/dscf; 0.015 lb/hr; 0.068 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.068 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.068 ton/yr
Emission Group 02 – Sand Plant					
EU19	Mold Silica Sand Silo	Bin Vent Filter (CU03)	0.0030 gr/dscf; 0.015 lb/hr; 0.001 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.001 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.001 ton/yr

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Unit	Description	BACT Control Device	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
EU20	Blend Silo	Bin Vent Filter (CU04)	0.0030 gr/dscf; 0.015 lb/hr; 0.001 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.001 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.001 ton/yr
EU21	Bentonite Silo	Bin Vent Filter (CU05)	0.0030 gr/dscf; 0.015 lb/hr; 0.001 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.001 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.001 ton/yr
EU35A	Core Silica Sand Silo A	Bin Vent Filter (CU19)	0.0030 gr/dscf; 0.015 lb/hr; 0.001 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.001 ton/yr	0.0030 gr/dscf; 0.0015 lb/hr; 0.001 ton/yr
EU35B	Core Silica Sand Silo B	Bin Vent Filter (CU20)	0.0030 gr/dscf; 0.015 lb/hr; 0.001 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.001 ton/yr	0.0030 gr/dscf; 0.0015 lb/hr; 0.001 ton/yr
EU57	Sand Plant Baghouse Waste Sand Silo	Bin Vent Filter (CU10)	0.0030 gr/dscf; 0.015 lb/hr; 0.068 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.068 ton/yr	0.0030 gr/dscf; 0.009 lb/hr; 0.068 ton/yr
Emission Group 03 – Casting & Molding					
Emission Group 04 – Fettling Shop					
EU63	Fettling Baghouse Waste Dust Silo	Bin Vent Filter (CU12)	0.0030 gr/dscf; 0.015 lb/hr; 0.068 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.068 ton/yr	0.0030 gr/dscf; 0.015 lb/hr; 0.068 ton/yr

e. The permittee shall not emit to the atmosphere total VOC emissions greater than the following: [401 KAR 51:017]

Emission Unit	Description	BACT Control Device	BACT for VOC
Emission Group 01 – Melt Shop			

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Unit	Description	BACT Control Device	BACT for VOC
Emission Group 03 – Casting & Molding			
EU53	Shakeout Conveyor	None	0.528 lb/ton gray iron; 24.18 ton/yr

f. The permittee shall not emit to the atmosphere total CO emissions greater than the following: [401 KAR 51:017]

Emission Unit	Description	BACT Control Device	BACT for CO
Emission Group 01 – Melt Shop			
Emission Group 03 – Casting & Molding			
EU53	Shakeout Conveyor	None	1.00 lb/ton gray iron; 25.3 lb/hr

Compliance Demonstration Method:
Refer to **3. Testing Requirements, 4. Specific Monitoring Requirements, 5. Specific Recordkeeping Requirements, 6. Specific Reporting Requirements,** and **7. Specific Control Equipment Operating Conditions.**

g. Refer to **SECTION D** for group PSD limits for PM, PM_{10}, $PM_{2.5}$, VOC, and CO, and source-wide HAP emission limitations.

3. Testing Requirements:

a.

b. The permittee shall conduct each opacity test for fugitive emissions according to the requirements in 40 CFR 63.6(h)(5) and Table 1 to 40 CFR 63, Subpart ZZZZZ. [40 CFR 63.10898(h)]

c. The permittee shall conduct subsequent performance tests to demonstrate compliance with the opacity limit in 40 CFR 63.10895(e) no less frequently than every 6 months and each time the permittee makes a process change likely to increase fugitive emissions. [40 CFR 63.10898(i)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

d. For fugitive emissions from buildings or structures housing any iron and steel foundry emissions sources subject to opacity limit in 40 CFR 63.10895(e), the permittee shall: [40 CFR 63, Subpart ZZZZZ, Table 1(2)]
   i. Using a certified observer, conduct each opacity test according to EPA Method 9 (40 CFR part 60, appendix A-4) and 40 CFR 63.6(h)(5). [40 CFR 63, Subpart ZZZZZ, Table 1(2)(a)]
      1) The certified observer may identify a limited number of openings or vents that appear to have the highest opacities and perform opacity observations on the identified openings or vents in lieu of performing observations for each opening or vent from the building or structure. Alternatively, a single opacity observation for the entire building or structure may be performed, if the fugitive release points afford such an observation. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(a)(i)]
      2) During testing intervals when PM performance tests, if applicable, are being conducted, conduct the opacity test such that the opacity observations are recorded during the PM performance tests. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(a)(ii)]
   ii. As alternative to Method 9 performance test, conduct visible emissions test by Method 22 (40 CFR part 60, appendix A-7). The test is successful if no visible emissions are observed for 90 percent of the readings over 1 hour. If VE is observed greater than 10 percent of the time over 1 hour, then the facility must conduct another performance test as soon as possible, but no later than 15 calendar days after the Method 22 test, using Method 9 (40 CFR part 60, appendix A-4). [40 CFR 63, Subpart ZZZZZ, Table 1(2)(b)]
      1) The observer may identify a limited number of openings or vents that appear to have the highest visible emissions and perform observations on the identified openings or vents in lieu of performing observations for each opening or vent from the building or structure. Alternatively, a single observation for the entire building or structure may be performed, if the fugitive release points afford such an observation. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(b)(i)]
      2) During testing intervals when PM performance tests, if applicable, are being conducted, conduct the visible emissions test such that the observations are recorded during the PM performance tests. [40 CFR 63, Subpart ZZZZZ, Table 1(2)(b)(ii)]

e. Except as provided in 401 KAR 50:045, performance tests used to demonstrate compliance with 401 KAR 59:010, Section 3 shall be conducted according to the following methods. Kentucky Methods 50 and 150(F-1) and other methods are filed by reference in 401 KAR 50:015. [401 KAR 59:010, Section 4]
   i. Reference Method 5 for the emission rates of particulate matter and the associated moisture content. [401 KAR 59:010, Section 4(1)]
   ii. Reference Method 1 for sample and velocity traverses. [401 KAR 59:010, Section 4(2)]
   iii. Reference Method 2 for velocity and volumetric flow rate. [401 KAR 59:010, Section 4(3)]
   iv. Reference Method 3 for gas analysis. [401 KAR 59:010, Section 4(4)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

v. Reference Method 9 for opacity of continuous emissions. [401 KAR 59:010, Section 4(5)]
vi. For Reference Method 5, Reference Method 1 shall be used to select the sampling site and the number of traverse sampling points. The sampling time for each run shall be at least sixty (60) minutes and the minimum sample volume shall be 0.85 dscm (thirty (30) dscf) except that smaller sampling time or volumes, when necessitated by process variables or other factors, may be approved by the Cabinet. [401 KAR 59:010, Section 4(7)]

f. Pursuant to 401 KAR 59:005, Section 2(2) and 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.

g. For emission unit EU53, the permittee shall perform individual initial performance testing according to 401 KAR 50:055 and every 5 years thereafter. This testing shall be used to demonstrate compliance with the individual BACT limitations in **2. Emission Limitations.** The testing shall also develop emission factors in pounds of pollutant per ton of gray iron for CO and VOC according to following test methods: [401 KAR 51:017]
h. 40 CFR 60, Appendix A, Method 10 for CO;
ii. 40 CFR 60, Appendix A, Method 25 for VOC;
iii. Or an alternate test method as approved by the Division.

i. The permittee shall, within 180 days of permit issuance, verify the direction of airflow through both the largest building wall opening closest to each process and the largest opening of each hood and exhaust pickup point, is inward using a smoke tube and the following procedures: [401 KAR 51:017]
i. The direction of airflow shall be monitored for at least 1 hour, with checks made no more than 10 minutes apart.
ii. The velocity pressure??? shall be monitored during the test.

i. Refer to **SECTION D** for group testing requirements.

4. Specific Monitoring Requirements:

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

a. I

b. For each emission unit listed above, the permittee shall monitor the following parameters:
   i. Monthly and 12-month rolling total hours of operation;
   ii. Monthly and 12-month rolling total throughput;
   iii. The monthly emission rate in ton/yr of PM, PM_{10}, $PM_{2.5}$, CO, and VOC for each process with an emission limitation in **2. Emission Limitations(d), (e),** or **(f),** calculated monthly.
   iv. The 12-month rolling total emission rate in ton/yr of PM, PM_{10}, $PM_{2.5}$, CO, and VOC for each process with an emission limitation in **2. Emission Limitations(d), (e),** or **(f),** calculated monthly.

c. For each emission unit listed above the permittee shall perform individual inspections during each day and certify that no visible fugitive emissions are detected from each applicable building opening. [401 KAR 51:017]

d. Refer to **SECTION E.**

5. Specific Recordkeeping Requirements:

a. As required by 40 CFR 63.10(b)(1) and as applicable, the permittee shall maintain files of all information (including all reports and notifications) for at least 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record. At a minimum, the most recent 2 years of data shall be retained on site. The remaining 3 years of data may be retained off site. Such files may be maintained on microfilm, on a computer, on computer floppy disks, on magnetic tape disks, or on microfiche. [40 CFR 63.10899(a)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

b. The permittee shall record the occurrence, duration, cause and any corrective action taken for any incident or malfunction that occurs that causes or might cause an exceedance of the particulate emission or opacity standard when an emission unit is in operation. A log of any required Method 9 observations and any required qualitative visual observations shall be kept and made available for inspection.

c. For each emission unit listed above, the permittee shall maintain records of the following:
   i. Monthly and 12-month rolling total hours of operation;
   ii. Monthly and 12-month rolling total throughput;
   iii. The monthly emission rate of PM, PM_{10}, $PM_{2.5}$, CO, and VOC for each process with an emission limitation in **2. Emission Limitations(d), (e),** or **(f)** calculated monthly.
   iv. The 12-month rolling total emission rate of PM, PM_{10}, $PM_{2.5}$, CO, and VOC for each process with an emission limitation in **2. Emission Limitations(d), (e),** or **(f)** calculated monthly.
   v. SDSs for all materials used.

d. The permittee shall maintain a copy of the GCOP plan required by **1. Operating Limitations (g)** as well as any revisions. [401 KAR 51:017]

e. The permittee shall maintain records of any time that EU05, EU06, , EU15, EU16, EU18, EU44, EU45, EU46, and EU47 was not operated according to the GCOP plan required by **1. Operating Limitations (g)** with a description of the situation and actions taken to remedy the issue. [401 KAR 51:017]

f. The permittee shall maintain records of the calculations required in **SECTION D**.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

6. Specific Reporting Requirements:

a. The permittee shall submit semiannual compliance reports to the Division according to the requirements in 40 CFR 63.10(e). The reports shall include, at a minimum, the following information as applicable: [40 CFR 63.10899(c)]

i. Summary information on the number, duration, and cause (including unknown cause, if applicable) of excursions or exceedances, as applicable, and the corrective action taken; [40 CFR 63.10899(c)(1)]

ii. Summary information on the number, duration, and cause (including unknown cause, if applicable) for monitor downtime incidents (other than downtime associated with zero and span or other calibration checks, if applicable); and [40 CFR 63.10899(c)(2)]

iii. Summary information on any deviation from the pollution prevention management practices in 40 CFR 63.10885 and 63.10886 and the operation and maintenance requirements 40 CFR 63.10896 and the corrective action taken. [40 CFR 63.10899(c)(3)]

(h). [401 KAR 51:017]

7. Specific Control Equipment Operating Conditions:

a. For EU17, EU19, EU20, EU21, EU35A, EU35B, EU57, and EU63, the permittee shall install, calibrate (if applicable), maintain and operate, according to manufacturer's specifications, bin vent filters designed to achieve the BACT limits in **2. Emission Limitations(d)**. The permittee shall make the bin vent filter manufacturer's specification available for inspection by the Division. [401 KAR 51:017]

b. For all emission units, other than those identified in **7.a. Specific Control Equipment Operating Conditions(a)**, the permittee shall install, calibrate (if applicable), maintain and operate, according to manufacturer's specifications, fabric filters designed to achieve the BACT limits in **SECTION D(5)**. The permittee shall make the fabric filter manufacturer's specifications available for inspection by the Division. [401 KAR 51:017]

c. Refer to **SECTION E** for control device requirements pursuant to 40 CFR 63, Subpart ZZZZZ and 401 KAR 51:017.

d. The permittee shall operate the control devices associated with each emission unit at all times that the emission unit is operating. [401 KAR 51:017]

e. The permittee shall install, operate, and maintain a Sulfuric Acid Scrubber for control of amine gas emitted from the PUCB Core Machines (EU39-EU42). [401 KAR 51:017]

f. For each baghouse, the permittee shall continuously monitor the inlet??? Velocity pressure???volumetric flow rate in the stack, and maintain it at 80% or above the level measured during the testing required by **3. Testing Requirements (i)**.

g. The permittee shall install, calibrate (if applicable), maintain and operate, according to manufacturer's specifications, a monitoring device (differential pressure gauges or manometers) to determine the pressure drop across each baghouse, at a minimum, once a day during the operation of the unit. A permanent label displaying the operating range

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

established for each baghouse shall be posted next to the selected instrument. [401 KAR 51:017]

8. Alternate Operating Scenarios:
Refer to **Section H**.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Coating Operations

Emission Group 06 – Coating

Emission Unit 68 (EU68) Paint Line #3
Booth #1 Description:
Model: Sturm Maschinenbau ZS16
Estimated Start of Construction:
September 2018
Maximum Capacity: 7.22 lb post-induction coating (coating and thinner)/hr Controls: Paint Booth Filter (CU14)

Emission Unit 69 (EU69) Paint Line #2
Description:
Model: Sturm Maschinenbau ZS16
Estimated Start of Construction: November 2017
Maximum Capacity: 7.22 lb post-induction coating (coating and thinner)/hr Controls: Paint Booth Filter (CU15)

Emission Unit 71 (EU71) Paint Line #1
Description:
Model: Sturm Maschinenbau ZS16
Estimated Start of Construction: March 2017Maximum Capacity: 3.54 lb pre-induction coating/hr Controls: Paint Booth Filter (CU17)

Description: **Three** (3) paint booths that apply coatings to finished parts. EU 68-69 apply a zinc paint to each part, EU71 applies a zinc solution. Each of these paint booths are equipped with electrostatic spray nozzles that achieve at least 70% transfer efficiency.

APPLICABLE REGULATIONS:
401 KAR 51:017, Prevention of significant deterioration of air quality.
401 KAR 59:010, New process operations.
401 KAR 59:225, New miscellaneous metal parts and products surface coating operations.

STATE-ORIGIN REQUIREMENTS:
401 KAR 63:020, Potentially hazardous matter or toxic substances, applicable with respect to each affected facility which emits or may emit Xylene, Methanol, or Zinc.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

PRECLUDED REGULATIONS:

40 CFR 63, Subpart HHHHHH, National Emission Standards for Hazardous Air Pollutants: Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources.

1. **Operating Limitations:**
   a. The permittee shall only use coatings with a VOC content of less than three and five-tenths (3.5) lb/gal of coating (0.42 kg/l), excluding water or exempt solvent or both, delivered to applicators associated with air or forced air-dried items or items subject to outdoor or harsh exposure or extreme environmental conditions. [401 KAR 59:225, Section 6(1)(b); 401 KAR 51:017]

   b. The permittee shall only use post-induction coatings with a solids content of less than 0.87 lb/lb of coating delivered to the applicators. [401 KAR 51:017]

   c. The permittee shall only use pre-induction coatings with a solids content of less than 0.35 lb/lb of coating delivered to the applicators. [401 KAR 51:017]

   d. The amount of exempt solvent shall be subtracted from the amount of coatings, just like water, with the ultimate value of interest being the mass of VOC per unit volume of coating less exempt solvent or water or both. [401 KAR 59:225, Section 4(6)]

   e. The permittee shall not use any spray-applied coating that contains any individual compounds of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd) that are an Occupational Safety and Health Administration (OSHA)-defined carcinogen as specified in 29 CFR 1910.1200(d)(4) at a concentration greater than 0.1 percent by mass, or greater than 1.0 percent by mass for any other individual compound of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd). For the purpose of determining whether materials used contain compounds of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd), the permittee may rely on formulation data provided by the manufacturer or supplier, such as the material safety data sheet (MSDS), as long as it represents each compound of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd) in the material that is present at 0.1 percent by mass or more for compounds of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd) that are OSHA-defined carcinogens as specified in 29 CFR 1910.1200(d)(4) and at 1.0 percent by mass or more for other compounds of chromium (Cr), lead (Pb), manganese (Mn), nickel (Ni), or cadmium (Cd). [To preclude 40 CFR 63, Subpart HHHHHH]

   f. The permittee shall limit the throughput through EU68, EU69 to a combined 63.25 tons/yr of post-induction coating (coating and thinner) on a rolling 12-month basis. [401 KAR 51:017]

   g. The permittee shall limit the throughput through EU71 to 15.5 tons/yr of pre-induction coating on a rolling 12-month basis. [401 KAR 51:017]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

h. The permittee shall limit thinner usage to a combined 12.88 tons/yr of thinner on a rolling 12-month basis. [401 KAR 51:017]

i. The permittee shall maintain and implement a work practice plan to minimize VOC emissions from the storage, mixing, and conveying of coatings, thinners, and cleaning materials used in, and waste materials generated by, all coating operations. The plan shall specify practices and procedures to ensure that, at a minimum, the following elements are implemented: [401 KAR 51:017]
   i. All VOC-containing coatings, thinners, cleaning materials, and waste materials shall be stored in closed containers.
   ii. The risk of spills of VOC-containing coatings, thinners, cleaning materials, and waste materials shall be minimized.
   iii. VOC-containing coatings, thinners, cleaning materials, and waste materials shall be conveyed from one location to another in closed containers or pipes.
   iv. Mixing vessels which contain VOC-containing coatings and other materials shall be closed except when adding to, removing, or mixing the contents.
   v. Emissions of VOC shall be minimized during cleaning of storage, mixing, and conveying equipment.

j. The permittee shall ensure that each paint booth capture system achieves 100% efficiency. The permittee shall demonstrate this by meeting the following requirements: [401 KAR 51:017]
   i. Performing testing according to **3. Testing Requirements (f).**
   ii. Ensuring all coatings and thinners used in the coating operation are applied within the capture system, and coating solvent flash-off and coating curing and drying occurs within the capture system. For example, this criterion is not met if parts enter the open shop environment when being moved between a spray booth and a curing oven.
   iii. The direction of the air flow at all times shall be into the enclosure; and either
      1) The average facial velocity of air through all natural draft openings in the enclosure shall be at least 200 feet per minute; or
      2) The pressure drop across the enclosure shall be at least 0.007 inch water, as established in Method 204 of appendix M to 40 CFR part 51.

k. The permittee shall maintain the facial velocity of air flow through all natural draft openings or the pressure drop at or above the facial velocity limit or pressure drop limit, and maintain the direction of air flow into the enclosure at all times. [401 KAR 51:017]

Compliance Demonstration Method:
Refer to **3. Testing Requirements, 4. Specific Monitoring Requirements, 5. Specific Recordkeeping Requirements, 6. Specific Reporting Requirements**, and **7. Specific Control Equipment Operating Conditions.**

2. Emission Limitations:

a. The permittee shall not cause, suffer, allow, or permit any visible emission of particulate matter into the open air from a control device or stack associated with any affected facility which is equal to or greater than twenty (20) percent opacity for more than three

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

(3) minutes, as measured by U.S. EPA Reference Method 9. [401 KAR 59:010, Section 3(1)(a); 401 KAR 51:017]

Compliance Demonstration Method:
Refer to **4. Monitoring Requirements(c)** for opacity compliance demonstration.

b. For emissions from a control device or stack no person shall cause, suffer, allow or permit the emission into the open air of particulate matter from any affected facility which is in excess of the following: [401 KAR 59:010, Section 3(2)]
   i. For process weight rates of 0.50 ton/hr or less: 2.34 lb/hr
   ii. For process weight rates up to 30 tons/hr: $E'_{PM_j} = 3.59P_j^{0.62}$
   iii. For process weight rates greater than 30 tons/hr: $E'_{PM_j} = 17.31P_j^{0.16}$

   Where:
   j = Emission Unit;
   E'_{PM_i} = The allowable particulate emission rate for unit j in pounds/hour;
   P_j = The average process weight rate in tons/hour

   Compliance Demonstration Method:
   Compliance with the hourly particulate emission limitations in 401 KAR 59:010, Section 3(2) is assumed when compliance with the limitations in **2. Emission Limitations(c)** is demonstrated.

c. For EU68 and EU69 the permittee shall not cause or contribute to combined total emissions of PM, PM_{10}, and $PM_{2.5}$ that, on a rolling 12-month basis, equal or exceed 0.202 tons of PM, PM_{10}, or $PM_{2.5}$ per year. [401 KAR 51:017]

d. For EU71, the permittee shall not cause or contribute to total emissions of PM, PM_{10}, and $PM_{2.5}$ that, on a rolling 12-month basis, equal or exceed 1.133 tons of PM, PM_{10}, or $PM_{2.5}$ per year. [401 KAR 51:017]

e. For EU68 and EU69, the permittee shall not cause or contribute to combined total emissions of VOC (including contributions from thinner usage) that, on a rolling 12-month basis, equal or exceed 19.425 tons of VOC per year. [401 KAR 51:017]

f. EU71, the permittee shall not cause or contribute to total emissions of VOC that, on a rolling 12-month basis, equal or exceed 3.244 tons of VOC per year. [401 KAR 51:017]

Compliance Demonstration Method:
Refer to **3. Testing Requirements**, **4. Specific Monitoring Requirements**, **5. Specific Recordkeeping Requirements**, and **7. Specific Control Equipment Operating Conditions.**

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

g. The source is in compliance with 401 KAR 63:020 based on the emission rates of toxics and hazardous air pollutants given in the application and supplemental information submitted by the source.
h. Refer to **SECTION D** for source-wide HAP emission limitations.

3. Testing Requirements:

a. If deemed necessary by the Cabinet, the Cabinet shall obtain samples of the coatings used at an affected facility to verify that the coatings meet the requirements in 401 KAR 59:225, Section 6. Appendix A to 40 CFR 60, Method 24, which has been incorporated by reference in 401 KAR 50:015, shall be used as applicable to determine compliance of the coatings unless the Cabinet determines that other methods would be more appropriate. [401 KAR 59:225, Section 4(4)]

b. Except as provided in 401 KAR 50:045, performance tests used to demonstrate compliance with 401 KAR 59:010, Section 3 shall be conducted according to the following methods. Kentucky Methods 50 and 150(F-1) and other methods are filed by reference in 401 KAR 50:015. [401 KAR 59:010, Section 4]
   i. Reference Method 5 for the emission rates of particulate matter and the associated moisture content. [401 KAR 59:010, Section 4(1)]
   ii. Reference Method 1 for sample and velocity traverses. [401 KAR 59:010, Section 4(2)]
   iii. Reference Method 2 for velocity and volumetric flow rate. [401 KAR 59:010, Section 4(3)]
   iv. Reference Method 3 for gas analysis. [401 KAR 59:010, Section 4(4)]
   v. Reference Method 9 for opacity of continuous emissions. [401 KAR 59:010, Section 4(5)]
   vi. For Reference Method 5, Reference Method 1 shall be used to select the sampling site and the number of traverse sampling points. The sampling time for each run shall be at least sixty (60) minutes and the minimum sample volume shall be 0.85 dscm (thirty (30) dscf) except that smaller sampling time or volumes, when necessitated by process variables or other factors, may be approved by the Cabinet. [401 KAR 59:010, Section 4(7)]

c. For emission units EU68, EU69 and EU71, the permittee shall perform individual initial performance testing according to 401 KAR 50:055 and every 5 years thereafter. This testing shall be used to demonstrate compliance with the individual BACT limitations in **2. Emission Limitations** and **1. Operating Limitations(a)**. This testing shall also develop inlet and outlet emission factors in pounds of pollutant per pound of coating for PM, PM_{10}, $PM_{2.5}$, and VOC according to following test methods: [401 KAR 51:017]
   i. 40 CFR 60, Appendix A, Method 5 for PM;
   ii. 40 CFR 51, Appendix M, Method 201A for PM_{10} and $PM_{2.5}$;
   iii. 40 CFR 60, Appendix A, Method 24 for VOC;
   iv. Or an alternate test method as approved by the Division.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

d. The permittee shall determine the mass fraction of organic HAP for each material used, on a monthly basis or when the formulation of the coating changes, by using one of the options below:
   i. The permittee may use 40 CFR 63, Appendix A, Method 311 for determining the mass fraction of organic HAP.
   ii. For coatings, the permittee may use Method 24 to determine the mass fraction of nonaqueous volatile matter and use that value as a substitute for mass fraction of organic HAP.
   iii. The permittee may rely on information other than that generated by the test methods specified above, such as manufacturer's formulation data, if it represents each organic HAP that is present at 0.1 percent by mass or more for OSHA-defined carcinogens, as specified in 29 CFR 1910.1200(d)(4), and at 1.0 percent by mass or more for other compounds. If there is a disagreement between such information and results of a test conducted according to the terms above, then the test method results will take precedence, unless after consultation, the facility demonstrates to the satisfaction of the Division that the facility's data are correct. If a range of values is given for the mass fraction, the permittee shall use the maximum of the range in the calculation of emissions.

e. The permittee shall determine the density of each material used during the month from test results using ASTM Method D1475-98 (Reapproved 2003), "Standard Test Method for Density of Liquid Coatings, Inks, and Related Products" or information from the supplier or manufacturer of the material. If there is disagreement between ASTM Method D1475-98 (Reapproved 2003) test results and the supplier's or manufacturer's information, the test results will take precedence unless after consultation, the facility demonstrates to the satisfaction of the Division that the facility's data are correct.

f. The permittee shall demonstrate that the capture system meets the criteria in Method 204 of appendix M to 40 CFR part 51 for a PTE.

g. Pursuant to 401 KAR 59:005, Section 2(2) and 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.

4. Specific Monitoring Requirements:

a. The permittee shall determine the volume in gallons of each material used during each month by measurement or usage records.

b. The permittee shall monitor and record the direction of air flow, and either:
   i. The facial velocity of air through all natural draft openings according to the following requirements for each flow measurement device, or:

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

1) The permittee shall locate a flow sensor in a position that provides a representative flow measurement in the duct from each capture device in the emission capture system to the add-on control device.
2) The permittee shall reduce swirling flow or abnormal velocity distributions due to upstream and downstream disturbances.
3) The permittee shall conduct a flow sensor calibration check at least semiannually.
4) The permittee shall, at least monthly, inspect components for integrity, electrical connections for continuity, and mechanical connections for leakage.

ii. The pressure drop across the enclosure according to the following requirements for each flow measurement device:
1) The permittee shall locate the pressure tap(s) in a position that provides a representative measurement of the pressure drop across each opening that is being monitored.
2) The permittee shall minimize or eliminate pulsating pressure, vibration, and internal and external corrosion.
3) The permittee shall check pressure tap pluggage daily.
4) The permittee shall, using an inclined manometer with a measurement sensitivity of 0.0002 inch water, check gauge calibration quarterly and transducer calibration monthly.
5) The permittee shall conduct calibration checks any time the sensor exceeds the manufacturer's specified maximum operating pressure range or install a new pressure sensor.
6) The permittee shall, at least monthly, inspect components for integrity, electrical connections for continuity, and mechanical connections for leakage.

c. The permittee shall perform a qualitative visual observation of the opacity of emissions at each stack daily and maintain a log of the observations. If visible emissions from a stack are seen (not including condensed water in the plume), then an inspection of process/control equipment shall be initiated and corrective action taken. If visible emissions are present after the corrective action, the process shall be shut down and shall not operate again until repairs have been made that result in no visible emissions from the process during operation. In lieu of shutting the process down, the permittee may determine the opacity using Reference Method 9. If the opacity limit is not exceeded, the process may continue to operate.

d. For each emission unit listed above, the permittee shall monitor the following parameters:
i. Monthly and 12-month rolling total hours of operation;
ii. Monthly and 12-month rolling total coating throughput;
iii. Monthly and 12-month rolling thinner usage;

Monthly and 12-month rolling total emissions of PM, PM_{10}, $PM_{2.5}$, VOC and HAP in tons/yr,

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

5. Specific Recordkeeping Requirements:

a. Daily records shall be maintained by the source for the most recent two (2) year period. These records shall be made available to the Cabinet or the U.S. EPA upon request. The records shall include, but not be limited to, the following: [401 KAR 59:225, Section 4(8)]
   i. Applicable administrative regulation number; [401 KAR 59:225, Section 4(8)(a)]
   ii. Application method and substrate type; [401 KAR 59:225, Section 4(8)(b)]
   iii. Amount and type of adhesive, coating (including catalyst and reducer for multicomponent coatings), or solvent used at each point of application, including exempt compounds; [401 KAR 59:225, Section 4(8)(c)]
   iv. The VOC content as applied in each adhesive, coating, or solvent; [401 KAR 59:225, Section 4(8)(d)]
   v. The date for each application for adhesive, coating, or solvent; [401 KAR 59:225, Section 4(8)(e)]
   vi. The amount of surface preparation, cleanup, or washup solvent (including exempt compounds) used and the VOC content of each; and [401 KAR 59:225, Section 4(8)(f)]
   vii. Oven temperature, if applicable. [401 KAR 59:225, Section 4(8)(g)]

b. The permittee shall record the occurrence, duration, cause and any corrective action taken for any incident or malfunction that occurs that causes or might cause an exceedance of the particulate emission or opacity standard when an emission unit is in operation. A log of Method 9 observations and qualitative visual observations shall be kept and made available for inspection.

c. For each emission unit listed above, the permittee shall maintain records of the following:
   i. Monthly and 12-month rolling total hours of operation;
   ii. Monthly and 12-month rolling total throughput;
   iii. Monthly and 12-month rolling thinner usage;
   iv. Monthly and 12-month rolling total emissions of PM, PM_{10}, $PM_{2.5}$, VOC, and HAP in tons/yr, calculated monthly according to the equation in **4. Specific Monitoring Requirements(b).**
   v. MSDSs for all materials used.

d. The permittee shall maintain records of the following:
   i. A current copy of information provided by materials suppliers or manufacturers, such as manufacturer's formulation data, or test data used to determine the mass fraction of organic HAP, the density and the volume fraction of coating solids for each coating, the mass fraction of organic HAP and the density for each thinner, and the mass fraction of organic HAP for each cleaning material.
   ii. If the permittee conducted testing to determine mass fraction of organic HAP, density, or volume fraction of coating solids, the permittee shall keep a copy of the complete test report.
   iii. If the permittee uses information provided by the manufacturer or supplier of the material that was based on testing, the permittee shall keep the summary sheet of results provided by the manufacturer or supplier.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

iv. If the permittee uses the results of an analysis conducted by an outside testing lab, the permittee shall keep a copy of the test report. The permittee is not required to obtain the test report or other supporting documentation from the manufacturer or supplier.
v. A record of the name and volume of each cleaning material used during each month.
vi. A record of the mass fraction of HAP and VOC for each cleaning material used during each month.
vii. A record of the density for each cleaning material used during each month.
viii. The data and documentation used to support a determination that the capture system meets the criteria in Method 204 of appendix M to 40 CFR part 51 for a PTE and has a capture efficiency of 100 percent.
ix. Records of the data and calculations used to establish the emission capture and add-on control device operating limits and to document compliance with the operating limitations.
x. Records of the data and calculations used to determine the transfer efficiency for all coatings.
xi. A record of the work practice plans required and documentation that the plans are being implemented on a continuous basis. Appropriate documentation may include operational and maintenance records, records of documented inspections, and records of internal audits.
xii. For each add-on control device and for each continuous parameter monitoring system, a copy of the equipment operating instructions shall be maintained on-site for the life of the equipment in a location readily available to plant operators and inspectors. The permittee may prepare the equipment operating instructions, or they may be provided by the equipment supplier or other third party.

e. Copies of the current work practice plans developed in accordance with **1. Operating Requirements(g)**, as well as plans developed within the preceding 5 years shall be available on-site for inspection and copying by the Division.

f. The permittee shall keep monthly records of the following:
i. For each coating used, a record of the volume used in each month, the mass fraction HAP content, the mass fraction VOC content, the density, and the volume fraction of solids.
ii. For each thinner used, a record of the volume used in each month, the mass fraction HAP content, the mass fraction VOC content, and the density.
iii. A record of the calculation of the HAP and VOC emission rate for all coatings and thinners. This record must include all raw data, algorithms, and intermediate calculations. If these data are maintained as electronic files, the electronic files, as well as any paper copies must be maintained.
iv. A record, for each month, of the calculation of the average monthly mass HAP and VOC content.

6. Specific Reporting Requirements:
Refer to **SECTION F**.

7. Specific Control Equipment Operating Conditions:

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

a. For all emission units listed above, the permittee shall install, maintain, and operate, according to manufacturer's specifications, fabric filters designed to achieve the BACT limits in **1. Operating Limitations(b)** and **(c)**, and **2. Emission Limitations(c)**. The permittee shall make the manufacturer's specification records available for inspection by the Division. [401 KAR 51:017]

b. The permittee shall install, calibrate (as applicable), maintain and operate, according to manufacturer's specifications, a monitoring device (differential pressure gauges or manometers) to determine the pressure drop across each paint booth filter, at a minimum, once a day during the operation of the unit. A permanent label displaying the operating range established for each paint booth shall be posted next to the selected instrument. [401 KAR 51:017]

c. The permittee shall operate the control devices associated with each emission unit at all times that the emission unit is operating. [401 KAR 51:017]

d. The permittee shall install, operate, and maintain each Continuous Parameter Monitoring System (CPMS) each pressure drop and air flow according to the following: [401 KAR 52:020, Section 10]
   i. The CPMS shall complete a minimum of one cycle of operation for each successive 15-minute period. The permittee shall have a minimum of four equally spaced successive cycles of CPMS operation in 1 hour.
   ii. The permittee shall determine the average of all recorded readings for each successive 3-hour period of the emission capture system and add-on control device operation.
   iii. The permittee shall record the results of each inspection, calibration, and validation check of the CPMS.
   iv. The permittee shall maintain the CPMS at all times and have available necessary parts for routine repairs of the monitoring equipment.
   v. The permittee shall operate the CPMS and collect emission capture system and add-on control device parameter data at all times that a controlled coating operation is operating.

e. The permittee shall maintain a log detailing the operation and maintenance of the emission capture systems, add-on control devices, and continuous parameter monitoring systems (CPMS). [401 KAR 51:017]

8. Alternate Operating Scenarios:
Refer to **Section H**.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Group 07 – Emergency Generators > 500 HP

Emission Unit 72 (EU72) Emergency Generator #1
Description:
Model: Caterpillar #C 27 or equivalent
Estimated Start of Construction: August 2016
Engine Rating: 1050 HP
Controls: None

Emission Unit 73 (EU73) Emergency Generator #2
Description:
Model: Caterpillar #C 27 or equivalent
Estimated Start of Construction: August 2016
Engine Rating: 1050 HP
Controls: None

Emission Unit 74 (EU74) Emergency Generator #3
Description:
Model: Caterpillar #C 4 or equivalent
Estimated Start of Construction: August 2016
Engine Rating: 56 HP
Controls: None

Description: Three diesel fired compression ignition emergency generators: two that generate 750 kW each and one that generates 40 kW. All of these generators have a displacement of less than 30 liters per cylinder.

APPLICABLE REGULATIONS:

401 KAR 51:017, Prevention of significant deterioration of air quality.

401 KAR 60:005, Section 2(2)(dddd) implementing **40 CFR 60, Subpart IIII,** *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*

401 KAR 63:002, Section 2(4)(eeee) implementing **40 CFR 63, Subpart ZZZZ,** *National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*

Note: D.C. Circuit Court [*Delaware v. EPA*, 785 F. 3d 1 (D.C. Cir. 2015)] has vacated the provisions in 40 CFR 63, Subpart ZZZZ and 40 CFR 60, Subpart IIII that contain the 100-hour exemption for operation of emergency engines for purposes of emergency demand response under 40 CFR 63.6640(f)(2)(ii)-(iii) and 40 CFR 60.4211(f)(2)(ii)-(iii). The D.C. Circuit Court issued the mandate for the vacatur on May 4, 2016.

1. **Operating Limitations:**
   a. The permittee shall meet the requirements of 40 CFR 63, Subpart ZZZZ by meeting the requirements of 40 CFR part 60, Subpart IIII, for compression ignition engines. [40 CFR 63.6590(c)(1)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

b. The permittee shall operate and maintain the emission units listed above such that they achieve the emission standards as required in 40 CFR 60.4205 over the entire life of the engine. [40 CFR 60.4206]

c. The permittee shall use diesel fuel that meets the requirements of 40 CFR 80.510(b) for nonroad diesel fuel. [40 CFR 60.4207(b)]

d. The permittee shall install a non-resettable hour meter prior to startup of the engine. [40 CFR 60.4209(a)]

e. The permittee shall comply with the emission standards specified in 40 CFR 60.4205(b) by purchasing an engine certified to the emission standards in 40 CFR 60.4205(b) for the same model year and maximum engine power. The engine shall be installed and configured according to the manufacturer's emission-related specifications, except as permitted in 40 CFR 60.4211(g). [40 CFR 60.4211(c)]

f. The permittee shall operate the emergency stationary ICE according to the requirements in 40 CFR 60.4211(f)(1) through (3). In order for the engine to be considered an emergency stationary ICE under 40 CFR 60, Subpart IIII, any operation other than emergency operation, maintenance and testing, emergency demand response, and operation in non-emergency situations for 50 hours per year, as described in 40 CFR 60.4211(f)(1) through (3), is prohibited. If the permittee does not operate the engine according to the requirements in 40 CFR 60.4211(f)(1) through (3), the engine will not be considered an emergency engine under 40 CFR 60, Subpart IIII and shall meet all requirements for non-emergency engines. [40 CFR 60.4211(f)]
   i. There is no time limit on the use of emergency stationary ICE in emergency situations. [40 CFR 60.4211(f)(1)]
   ii. The permittee may operate the emergency stationary ICE for any combination of the purposes specified in 40 CFR 60.4211(f)(2)(i) through (iii) for a maximum of 100 hours per calendar year. Any operation for non-emergency situations as allowed by 40 CFR 60.4211(f)(3) counts as part of the 100 hours per calendar year allowed by 40 CFR 60.4211(f)(2). [40 CFR 60.4211(f)(2)]
      1) Emergency stationary ICE may be operated for maintenance checks and readiness testing, provided that the tests are recommended by federal, state or local government, the manufacturer, the vendor, the regional transmission organization or equivalent balancing authority and transmission operator, or the insurance company associated with the engine. The permittee may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the permittee maintains records indicating that federal, state, or local standards require maintenance and testing of emergency ICE beyond 100 hours per calendar year. [40 CFR 60.4211(f)(2)(i)]
   iii. Emergency stationary ICE may be operated for up to 50 hours per calendar year in non-emergency situations. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per calendar year for maintenance and testing and emergency demand response provided in 40 CFR 60.4211(f)(2). Except as provided

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

in 40 CFR 60.4211(f)(3)(i), the 50 hours per calendar year for non-emergency situations cannot be used for peak shaving or non-emergency demand response, or to generate income for a facility to an electric grid or otherwise supply power as part of a financial arrangement with another entity. [40 CFR 60.4211(f)(3)]

1) The 50 hours per year for non-emergency situations can be used to supply power as part of a financial arrangement with another entity if all of the following conditions are met: [40 CFR 60.4211(f)(3)(i)]
   A. The engine is dispatched by the local balancing authority or local transmission and distribution system operator; [40 CFR 60.4211(f)(3)(i)(A)]
   B. The dispatch is intended to mitigate local transmission and/or distribution limitations so as to avert potential voltage collapse or line overloads that could lead to the interruption of power supply in a local area or region. [40 CFR 60.4211(f)(3)(i)(B)]
   C. The dispatch follows reliability, emergency operation or similar protocols that follow specific NERC, regional, state, public utility commission or local standards or guidelines. [40 CFR 60.4211(f)(3)(i)(C)]
   D. The power is provided only to the facility itself or to support the local transmission and distribution system. [40 CFR 60.4211(f)(3)(i)(D)]
   E. The permittee identifies and records the entity that dispatches the engine and the specific NERC, regional, state, public utility commission or local standards or guidelines that are being followed for dispatching the engine. The local balancing authority or local transmission and distribution system operator may keep these records on behalf of the permittee. [40 CFR 60.4211(f)(3)(i)(E)]

g. If the permittee does not install, configure, operate, and maintain the engine and control device according to the manufacturer's emission-related written instructions, or the permittee changes emission-related settings in a way that is not permitted by the manufacturer, the permittee shall demonstrate compliance as follows: [40 CFR 60.4211(g)]

   The permittee shall keep a maintenance plan and records of conducted maintenance and shall, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, the permittee shall conduct an initial performance test to demonstrate compliance with the applicable emission standards within 1 year of startup, or within 1 year after an engine and control device is no longer installed, configured, operated, and maintained in accordance with the manufacturer's emission-related written instructions, or within 1 year after the permittee changes emission-related settings in a way that is not permitted by the manufacturer. The permittee shall conduct subsequent performance testing every 8,760 hours of engine operation or 3 years, whichever comes first, thereafter to demonstrate compliance with the applicable emission standards. [40 CFR 60.4211(g)(3)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Compliance Demonstration Method:
Refer to **4. Specific Monitoring Requirements**, **5. Specific Recordkeeping Requirements**, **6. Specific Reporting Requirements**, and **7. Specific Control Equipment Operating Conditions**.

2. Emission Limitations:

a. The permittee shall comply with the emission standards for new nonroad CI engines in 40 CFR 60.4202, for all pollutants, for the same model year and maximum engine power. [40 CFR 60.4205(b)]

b. The engines listed above shall be certified to meet the certification emission standards for new nonroad CI engines for the same model year and maximum engine power in 40 CFR 89.112 and 40 CFR 89.113 for all pollutants. [40 CFR 60.4202(a)(2)]

c. The permittee shall not cause or contribute to emissions that, on an individual basis, exceed the values listed in the table below. [401 KAR 51:017]

Emission Unit (EU)	PM (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO (g/hp-hr)	VOC (g/hp-hr)
EU72	0.149	0.149	0.149	2.60	4.77
EU73	0.149	0.149	0.149	2.60	4.77
EU74	0.298	0.298	0.298	3.73	3.50

Compliance Demonstration Method:
The permittee shall install, operate, and maintain each engine such that it meets or is certified to meet the emission limits in **2. Emission Limitations(c)**. The permittee shall maintain engine certifications onsite and available for inspection by the Division.

d. Refer to **SECTION D** for source-wide HAP emission limitations.

3. Testing Requirements:

a. If the permittee conducts performance tests pursuant to 40 CFR 60, Subpart IIII, they shall do so according to 40 CFR 60.4212(a) through (e). [40 CFR 60.4212]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

i. The performance test shall be conducted according to 40 CFR part 1042, subpart F, for stationary CI ICE with a displacement of greater than or equal to 10 liters per cylinder and less than 30 liters per cylinder. [40 CFR 60.4212(a)]
ii. Exhaust emissions from stationary CI ICE that are complying with the emission standards for new CI engines in 40 CFR part 1042 shall not exceed the NTE standards for the same model year and maximum engine power as required in 40 CFR 1042.101(c). [40 CFR 60.4212(e)]

b. Pursuant to 401 KAR 59:005, Section 2(2) and 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.

4. Specific Monitoring Requirements:

a. For each emission unit listed above, the permittee shall monitor the following parameters:
i. Monthly and 12-month rolling total hours of operation;
ii. Monthly and 12-month rolling total fuel throughput;

5. Specific Recordkeeping Requirements:

a. If the emergency engine does not meet the standards applicable to non-emergency engines in the applicable model year, the permittee shall keep records of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. The permittee shall record the time of operation of the engine and the reason the engine was in operation during that time. [40 CFR 60.4214(b)]

b. For each emission unit listed above, the permittee shall maintain records of the following:
i. Monthly and 12-month rolling total hours of operation;
ii. Monthly and 12-month rolling total fuel throughput;

6. Specific Reporting Requirements:

a. If an emergency stationary CI ICE operates or is contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in 40 CFR 60.4211(f)(2)(ii) and (iii) or operates for the purposes specified in 40 CFR 60.4211(f)(3)(i), the permittee shall submit an annual report according to the requirements in 40 CFR 60.4214(d)(1) through (3). [40 CFR 60.4214(d)]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Group 08 – Storage Tanks

a.]

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Group 08 – Storage Tanks

Emission Unit 75 (EU75) Diesel Storage Tank

Description:
Estimated Start of Construction: July 2019
Maximum Capacity: 2,000 gallons
Controls: None

APPLICABLE REGULATIONS:
401 KAR 51:017, Prevention of significant deterioration of air quality.

1. **Operating Limitations:**
The diesel storage tank (EU76) shall be equipped with a permanent submerged fill pipe. [401 KAR 51:017]

2. **Emission Limitations:**
None

3. **Testing Requirements:**
Pursuant to 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.

4. **Specific Monitoring Requirements:**
None

5. **Specific Recordkeeping Requirements:**
None

6. **Specific Reporting Requirements:**
None

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Group 09 – Roads
Description: Paved Roads within the PSD-prescribed source boundary. This includes emissions from trailer-truck (industrial) traffic only.
Estimated Start of Construction: September 2016
Controls: Vacuum sweeping

Emission Unit 76 (EU76) Paved Roadways

Description:
Length: 0.43 miles
Hours of Operation: 8760 hours/yr

APPLICABLE REGULATIONS:
401 KAR 51:017, Prevention of significant deterioration of air quality.
401 KAR 63:010, Fugitive emissions.

1. **Operating Limitations:**
   a. The permittee is authorized to operate 0.43 miles of paved roadways (EU76). [401 KAR 51:017]

   b. The permittee shall not cause, suffer, or allow any material to be handled, processed, transported, or stored; a building or its appurtenances to be constructed, altered, repaired, or demolished, or a road to be used without taking reasonable precaution to prevent particulate matter from becoming airborne. Such reasonable precautions shall include, when applicable, but not be limited to the following: [401 KAR 63:010, Section 3(1)]
      i. Application and maintenance of asphalt, oil, water, or suitable chemicals on roads, materials stockpiles, and other surfaces which can create airborne dusts; [401 KAR 63:010, Section 3(1)(b)]
      ii. Covering, at all times when in motion, open bodied trucks transporting materials likely to become airborne; [401 KAR 63:010, Section 3(1)(d)]
      iii. The maintenance of paved roadways in a clean condition; [401 KAR 63:010, Section 3(1)(e)]
      iv. The prompt removal of earth or other material from a paved street which earth or other material has been transported thereto by trucking or earth moving equipment or erosion by water. [401 KAR 63:010, Section 3(1)(f)]

2. **Emission Limitations:**
   a. ***Fugitive Emission Standard***: The permittee shall not cause or permit the discharge of visible fugitive dust emissions beyond the lot line of the property on which the emissions originate. [401 KAR 63:010, Section 3(2)]

   b. Refer to **SECTION D**.

3. **Testing Requirements:**
   Testing shall be conducted at such times as may be required by the Cabinet in accordance with 401 KAR 50:045.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

4. **Specific Monitoring Requirements:**
   Refer to **SECTION F** for general monitoring requirements.

5. **Specific Recordkeeping Requirements:**
   The permittee shall keep records of the dates that vacuum sweeping occurred according to **7. Specific Control Equipment Operating Conditions** and these records shall be made available to the Division upon request. Refer to **SECTION F** for general recordkeeping requirements.

6. **Specific Reporting Requirements:**
   Refer to **SECTION F** for general reporting requirements.

7. **Specific Control Equipment Operating Conditions:**
   The permittee shall vacuum sweep the pavement at least weekly, except during recent rain events, or as needed in the event of a spill. [401 KAR 51:017]

SECTION C - INSIGNIFICANT ACTIVITIES

The following listed activities have been determined to be insignificant activities for this source pursuant to 401 KAR 52:020, Section 6. Although these activities are designated as insignificant the permittee must comply with the applicable regulation. Process and emission control equipment at each insignificant activity subject to an opacity standard shall be inspected monthly and a qualitative visible emissions evaluation made. Results of the inspection, evaluation, and any corrective action shall be recorded in a log.

Description	Generally Applicable Regulation

There are no listed insignificant activities at this facility.

SECTION D - SOURCE EMISSION LIMITATIONS AND TESTING REQUIREMENTS

1. As required by Section 1b of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26; compliance with annual emissions and processing limitations contained in this permit, shall be based on emissions and processing rates for any twelve (12) consecutive months.

2. PM, PM_{10}, $PM_{2.5}$, CO, VOC, and HAP emissions, measured by applicable reference methods, or an equivalent or alternative method specified in 40 C.F.R. Chapter I, or by a test method specified in the state implementation plan shall not exceed the respective limitations specified herein.

SOURCEWIDE HAP LIMITS:

3. The permittee shall not cause or contribute to source-wide combined HAP emissions that equal or exceed 25 tons/year based on a 12-month rolling total as calculated monthly by the most recent permit application methodology. [Self-imposed to preclude major source status for HAP].

SECTION D - SOURCE EMISSION LIMITATIONS AND TESTING REQUIREMENTS (CONTINUED)

4. The permittee shall not cause or contribute to source-wide Xylene emissions that equal or exceed 10 tons/year based on a 12-month rolling total as calculated monthly by the most recent permit application methodology: [Self-imposed to preclude major source status for HAP]

SECTION D - SOURCE EMISSION LIMITATIONS AND TESTING REQUIREMENTS (CONTINUED)

5. The permittee shall not allow the emissions exiting the following control devices to exceed the following: [401 KAR 51:017]

Control Device (Stack)	Emission Units Controlled	Type of Control and Pollutants Controlled	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02) **	EU01, EU04, EU05, EU06, EU07, EU08, EU09, EU10, , EU13, EU15, EU16, EU18	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.002 gr/dscf; 2.643 lb/hr; 11.577 ton/yr	0.002 gr/dscf; 2.643 lb/hr; 11.577 ton/yr	0.002 gr/dscf; 2.643 lb/hr; 11.577 ton/yr
CU06 (ST07)	EU22, EU53	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0025 gr/dscf; 2.208 lb/hr; 9.673 ton/yr	0.0025 gr/dscf; 2.208 lb/hr; 9.673 ton/yr	0.0025 gr/dscf; 2.208 lb/hr; 9.673 ton/yr
CU08 (ST09)	EU33, EU34, EU36, , EU43, EU44, EU45, EU46, EU47, EU50, EU51, EU52, EU59,EU79, EU80, EU81, EU83	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.002 gr/dscf; 1.90 lb/hr; 8.321 ton/yr	0.002 gr/dscf; 1.90 lb/hr; 8.321 ton/yr	0.002 gr/dscf; 1.90lb/hr; 8.321 ton/yr
CU11 (ST12)	EU60, EU61, EU62, EU64, EU65	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.001 gr/dscf; 0.573 lb/hr; 2.511 ton/yr	0.001 gr/dscf; 0.573 lb/hr; 2.511 ton/yr	0.001 gr/dscf; 0.573 lb/hr; 2.511 ton/yr

Note: Refer to **Section H for alternate operating scenarios.

Compliance Demonstration

The permittee shall conduct performance testing on CU01, CU06, CU08, and CU11 to demonstrate initial compliance with the BACT limits listed above. The testing shall be performed according to the requirements of 401 KAR 50:055, and repeated every 5 years. The permittee shall use 40 CFR 60, Appendix A, Method 5 for PM, 40 CFR 51, Appendix M, Method 201A/202 for PM_{10} and $PM_{2.5}$.

Continuous compliance will be demonstrated by use of the bag leak detection system required in **SECTION E,** meeting the throughput limits for each process in **SECTION B**, and calculating the monthly and rolling 12-month ton/yr emissions using the emission calculation methodology presented in the air permit application.:

SECTION D - SOURCE EMISSION LIMITATIONS AND TESTING REQUIREMENTS (CONTINUED)

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SECTION D - SOURCE EMISSION LIMITATIONS AND TESTING REQUIREMENTS (CONTINUED)

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6. The permittee shall not allow the emissions exiting the following stacks to exceed the following: [401 KAR 51:017]

Stack or Vent	Emission Units Combined	BACT for VOC	BACT for CO
ST02	EU01, EU04, EU05, EU06, EU07, EU08, EU09, EU10, , EU13, EU15, EU16, EU18	3.854 lb/hr; 4.845 ton/yr	22.044 lb/hr; 31.849 ton/yr
ST07	EU22, EU53	13.358 lb/hr; 24.179 ton/yr	25.30 lb/hr ;45.793 ton/ yr
ST08	EU39, EU40, EU41, EU42	18.223 lb/hr; 33.309 ton/yr	N/A
ST09	EU33 , EU34 , EU36 , , EU43 , EU44 , EU45 , EU46 , EU47 , EU50 , EU51 , EU52 , EU59 , EU79 , EU80 ,	33.256 lb/hr; 27.378 ton/yr	127.818 lb/hr; 234.736 ton/yr

	EU81 , EU83		

Compliance Demonstration

The permittee shall conduct performance testing on ST02, ST07, ST08, and ST09, to demonstrate initial compliance with the BACT limits listed above. The testing shall be performed according to the requirements of 401 KAR 50:055, and repeated every 5 years. The permittee shall use 40 CFR 60, Appendix A, Method 10 for CO and 40 CFR 60, Appendix A, Method 25 for VOC, or an alternate test method as approved by the Division.

SECTION D - SOURCE EMISSION LIMITATIONS AND TESTING REQUIREM

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SECTION E - SOURCE CONTROL EQUIPMENT REQUIREMENTS

1. Pursuant to 401 KAR 50:055, Section 2(5), at all times, including periods of startup, shutdown and malfunction, owners and operators shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Division which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source.

2. The following requirements apply to control devices controlling foundry operations, which includes CU01.
   a. The permittee shall install, operate, and maintain a bag leak detection system for each negative pressure baghouse or positive pressure baghouse. The permittee shall install, operate, and maintain each bag leak detection system according to the requirements in 40 CFR 63.10897(d)(1) through (3). [40 CFR 63.10897(d)]
      i. Each bag leak detection system shall meet the requirements in 40 CFR 63.10897(d)(1)(i) through (vii). [40 CFR 63.10897(d)(1)]
         1) The system shall be certified by the manufacturer to be capable of detecting emissions of particulate matter at concentrations of 10 milligrams per actual cubic meter (0.00044 grains per actual cubic foot) or less. [40 CFR 63.10897(d)(1)(i)]
         2) The bag leak detection system sensor shall provide output of relative particulate matter loadings and the permittee shall continuously record the output from the bag leak detection system using a strip chart recorder, data logger, or other means. [40 CFR 63.10897(d)(1)(ii)]
         3) The system shall be equipped with an alarm that will sound when an increase in relative particulate loadings is detected over the alarm set point established in the operation and maintenance plan, and the alarm shall be located such that it can be heard by the appropriate plant personnel. [40 CFR 63.10897(d)(1)(iii)]
         4) The initial adjustment of the system shall, at minimum, consist of establishing the baseline output by adjusting the sensitivity (range) and the averaging period of the device, and establishing the alarm set points. If the system is equipped with an alarm delay time feature, the permittee shall also adjust the alarm delay time. [40 CFR 63.10897(d)(1)(iv)]
         5) Following the initial adjustment, the permittee shall not adjust the sensitivity or range, averaging period, alarm set point, or alarm delay time. Except, once per quarter, the permittee may adjust the sensitivity of the bag leak detection system to account for seasonable effects including temperature and humidity according to the procedures in the monitoring plan required by 40 CFR 63.10897(d)(2). [40 CFR 63.10897(d)(1)(v)]
         6) For negative pressure baghouses, induced air baghouses, and positive pressure baghouses that are discharged to the atmosphere through a stack, the bag leak detector sensor shall be installed downstream of the baghouse and upstream of any wet scrubber. [40 CFR 63.10897(d)(1)(vi)]
         7) Where multiple detectors are required, the system's instrumentation and alarm may be shared among detectors. [40 CFR 63.10897(d)(1)(vii)]
      ii. The permittee shall prepare a site-specific monitoring plan for each bag leak detection system to be incorporated in the O&M plan. The permittee shall operate and maintain each bag leak detection system according to the plan at all times. Each plan shall

SECTION E - SOURCE CONTROL EQUIPMENT REQUIREMENTS (CONTINUED)

address all of the items identified in 40 CFR 63.10897(d)(2)(i) through (vi). [40 CFR 63.10897(d)(2)]

1) Installation of the bag leak detection system. [40 CFR 63.10897(d)(2)(i)]
2) Initial and periodic adjustment of the bag leak detection system including how the alarm set-point will be established. [40 CFR 63.10897(d)(2)(ii)]
3) Operation of the bag leak detection system including quality assurance procedures. [40 CFR 63.10897(d)(2)(iii)]
4) Maintenance of the bag leak detection system including a routine maintenance schedule and spare parts inventory list. [40 CFR 63.10897(d)(2)(iv)]
5) How the bag leak detection system output will be recorded and stored. [40 CFR 63.10897(d)(2)(v)]
6) Procedures for determining what corrective actions are necessary in the event of a bag leak detection alarm as required in 40 CFR 63.10897(d)(3). [40 CFR 63.10897(d)(2)(vi)]

iii. In the event that a bag leak detection system alarm is triggered, the permittee shall initiate corrective action to determine the cause of the alarm within 1 hour of the alarm, initiate corrective action to correct the cause of the problem within 24 hours of the alarm, and complete corrective action as soon as practicable, but no later than 10 calendar days from the date of the alarm. The permittee shall record the date and time of each valid alarm, the time that corrective action was initiated, the correction action taken, and the date on which corrective action was completed. Corrective actions may include, but are not limited to: [40 CFR 63.10897(d)(3)]

1) Inspecting the bag house for air leaks, torn or broken bags or filter media, or any other condition that may cause an increase in emissions. [40 CFR 63.10897(d)(3)(i)]
2) Sealing off defective bags or filter media. [40 CFR 63.10897(d)(3)(ii)]
3) Replacing defective bags or filter media or otherwise repairing the control device. [40 CFR 63.10897(d)(3)(iii)]
4) Sealing off a defective baghouse department. [40 CFR 63.10897(d)(3)(iv)]
5) Cleaning the bag leak detection system probe, or otherwise repairing the bag leak detection system. [40 CFR 63.10897(d)(3)(v)]
6) Shutting down the process producing the particulate emissions. [40 CFR 63.10897(d)(3)(vi)]

SECTION F - MONITORING, RECORDKEEPING, AND REPORTING REQUIREMENTS

1. Pursuant to Section 1b-IV-1 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26, when continuing compliance is demonstrated by periodic testing or instrumental monitoring, the permittee shall compile records of required monitoring information that include:
   a. Date, place as defined in this permit, and time of sampling or measurements;
   b. Analyses performance dates;
   c. Company or entity that performed analyses;
   d. Analytical techniques or methods used;
   e. Analyses results; and
   f. Operating conditions during time of sampling or measurement.

2. Records of all required monitoring data and support information, including calibrations, maintenance records, and original strip chart recordings, and copies of all reports required by the Division for Air Quality, shall be retained by the permittee for a period of five (5) years and shall be made available for inspection upon request by any duly authorized representative of the Division for Air Quality [Sections 1b-IV-2 and 1a-8 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

3. In accordance with the requirements of 401 KAR 52:020, Section 3(1)h, the permittee shall allow authorized representatives of the Cabinet to perform the following during reasonable times:
   a. Enter upon the premises to inspect any facility, equipment (including air pollution control equipment), practice, or operation;
   b. To access and copy any records required by the permit:
   c. Sample or monitor, at reasonable times, substances or parameters to assure compliance with the permit or any applicable requirements.

   Reasonable times are defined as during all hours of operation, during normal office hours; or during an emergency.

4. No person shall obstruct, hamper, or interfere with any Cabinet employee or authorized representative while in the process of carrying out official duties. Refusal of entry or access may constitute grounds for permit revocation and assessment of civil penalties.

5. Summary reports of any monitoring required by this permit shall be submitted to the Regional Office listed on the front of this permit at least every six (6) months during the life of this permit, unless otherwise stated in this permit. For emission units that were still under construction or which had not commenced operation at the end of the 6-month period covered by the report and are subject to monitoring requirements in this permit, the report shall indicate that no monitoring was performed during the previous six months because the emission unit was not in operation [Sections 1b-V-1 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

SECTION F - MONITORING, RECORDKEEPING, AND REPORTING REQUIREMENTS (CONTINUED)

6. The semi-annual reports are due by January 30th and July 30th of each year. All reports shall be certified by a responsible official pursuant to 401 KAR 52:020, Section 23. If continuous emission and opacity monitors are required by regulation or this permit, data shall be reported in accordance with the requirements of 401 KAR 59:005, General Provisions, Section 3(3). All deviations from permit requirements shall be clearly identified in the reports.

7. In accordance with the provisions of 401 KAR 50:055, Section 1, the owner or operator shall notify the Regional Office listed on the front of this permit concerning startups, shutdowns, or malfunctions as follows:
   a. When emissions during any planned shutdowns and ensuing startups will exceed the standards, notification shall be made no later than three (3) days before the planned shutdown, or immediately following the decision to shut down, if the shutdown is due to events which could not have been foreseen three (3) days before the shutdown.
   b. When emissions due to malfunctions, unplanned shutdowns and ensuing startups are or may be in excess of the standards, notification shall be made as promptly as possible by telephone (or other electronic media) and shall be submitted in writing upon request.

8. The owner or operator shall report emission related exceedances from permit requirements including those attributed to upset conditions (other than emission exceedances covered by Section F.7 above) to the Regional Office listed on the front of this permit within 30 days. Deviations from permit requirements, including those previously reported under F.7 above, shall be included in the semiannual report required by F.6 [Sections 1b-V, 3 and 4 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

9. Pursuant to 401 KAR 52:020, Title V permits, Section 21, the permittee shall annually certify compliance with the terms and conditions contained in this permit, by completing and returning a Compliance Certification Form (DEP 7007CC) (or an alternative approved by the regional office) to the Regional Office listed on the front of this permit and the U.S. EPA in accordance with the following requirements:
   a. Identification of the term or condition;
   b. Compliance status of each term or condition of the permit;
   c. Whether compliance was continuous or intermittent;
   d. The method used for determining the compliance status for the source, currently and over the reporting period.
   e. For an emissions unit that was still under construction or which has not commenced operation at the end of the 12-month period covered by the annual compliance certification, the permittee shall indicate that the unit is under construction and that compliance with any applicable requirements will be demonstrated within the timeframes specified in the permit.
   f. The certification shall be submitted by January 30th of each year. Annual compliance certifications shall be sent to the following addresses:

SECTION F - MONITORING, RECORDKEEPING, AND REPORTING REQUIREMENTS (CONTINUED)

Division for Air Quality Bowling Green Regional Office 2642 Russellville Road Bowling Green, KY 42101	U.S. EPA Region 4 Air Enforcement Branch Atlanta Federal Center 61 Forsyth St. SW Atlanta, GA 30303-8960

10. In accordance with 401 KAR 52:020, Section 22, the permittee shall provide the Division with all information necessary to determine its subject emissions within 30 days of the date the Kentucky Emissions Inventory System (KYEIS) emissions survey is mailed to the permittee.

SECTION G - GENERAL PROVISIONS

1. General Compliance Requirements

   a. The permittee shall comply with all conditions of this permit. Noncompliance shall be a violation of 401 KAR 52:020, Section 3(1)(b), and a violation of Federal Statute 42 USC 7401 through 7671q (the Clean Air Act). Noncompliance with this permit is grounds for enforcement action including but not limited to termination, revocation and reissuance, revision or denial of a permit [Section 1a-3 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

   b. The filing of a request by the permittee for any permit revision, revocation, reissuance, or termination, or of a notification of a planned change or anticipated noncompliance, shall not stay any permit condition [Section 1a-6 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

   c. This permit may be revised, revoked, reopened and reissued, or terminated for cause in accordance with 401 KAR 52:020, Section 19. The permit will be reopened for cause and revised accordingly under the following circumstances:
      (1) If additional applicable requirements become applicable to the source and the remaining permit term is three (3) years or longer. In this case, the reopening shall be completed no later than eighteen (18) months after promulgation of the applicable requirement. A reopening shall not be required if compliance with the applicable requirement is not required until after the date on which the permit is due to expire, unless this permit or any of its terms and conditions have been extended pursuant to 401 KAR 52:020, Section 12;
      (2) The Cabinet or the United States Environmental Protection Agency (U. S. EPA) determines that the permit must be revised or revoked to assure compliance with the applicable requirements;
      (3) The Cabinet or the U. S. EPA determines that the permit contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of the permit;
      (4) New requirements become applicable to a source subject to the Acid Rain Program.

      Proceedings to reopen and reissue a permit shall follow the same procedures as apply to initial permit issuance and shall affect only those parts of the permit for which cause to reopen exists. Reopenings shall be made as expeditiously as practicable. Reopenings shall not be initiated before a notice of intent to reopen is provided to the source by the Division, at least thirty (30) days in advance of the date the permit is to be reopened, except that the Division may provide a shorter time period in the case of an emergency.

   d. The permittee shall furnish information upon request of the Cabinet to determine if cause exists for modifying, revoking and reissuing, or terminating the permit; or to determine compliance with the conditions of this permit [Sections 1a- 7 and 8 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

   e. Emission units described in this permit shall demonstrate compliance with applicable requirements if requested by the Division [401 KAR 52:020, Section 3(1)(c)].

SECTION G - GENERAL PROVISIONS (CONTINUED)

f. The permittee, upon becoming aware that any relevant facts were omitted or incorrect information was submitted in the permit application, shall promptly submit such supplementary facts or corrected information to the permitting authority [401 KAR 52:020, Section 7(1)].

g. Any condition or portion of this permit which becomes suspended or is ruled invalid as a result of any legal or other action shall not invalidate any other portion or condition of this permit [Section 1a-14 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

h. The permittee shall not use as a defense in an enforcement action the contention that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance [Section 1a-4 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

i. All emission limitations and standards contained in this permit shall be enforceable as a practical matter. All emission limitations and standards contained in this permit are enforceable by the U.S. EPA and citizens except for those specifically identified in this permit as state-origin requirements. [Section 1a-15 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

j. This permit shall be subject to suspension if the permittee fails to pay all emissions fees within 90 days after the date of notice as specified in 401 KAR 50:038, Section 3(6) [Section 1a-10 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

k. Nothing in this permit shall alter or affect the liability of the permittee for any violation of applicable requirements prior to or at the time of permit issuance [401 KAR 52:020, Section 11(3) 2].

l. This permit does not convey property rights or exclusive privileges [Section 1a-9 of the *Cabinet Provisions and Procedures for Issuing Title V Permits* incorporated by reference in 401 KAR 52:020, Section 26].

m. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits, licenses, or approvals required by the Cabinet or any other federal, state, or local agency.

n. Nothing in this permit shall alter or affect the authority of U.S. EPA to obtain information pursuant to Federal Statute 42 USC 7414, Inspections, monitoring, and entry [401 KAR 52:020, Section 11(3) 4.].

o. Nothing in this permit shall alter or affect the authority of U.S. EPA to impose emergency orders pursuant to Federal Statute 42 USC 7603, Emergency orders [401 KAR 52:020, Section 11(3) 1.].

SECTION G - GENERAL PROVISIONS (CONTINUED)

p. This permit consolidates the authority of any previously issued PSD, NSR, or Synthetic Minor source preconstruction permit terms and conditions for various emission units and incorporates all requirements of those existing permits into one single permit for this source.

q. Pursuant to 401 KAR 52:020, Section 11, a permit shield shall not protect the owner or operator from enforcement actions for violating an applicable requirement prior to or at the time of permit issuance. Compliance with the conditions of this permit shall be considered compliance with:
(1) Applicable requirements that are included and specifically identified in this permit; and
(2) Non-applicable requirements expressly identified in this permit.

2. Permit Expiration and Reapplication Requirements

a. This permit shall remain in effect for a fixed term of five (5) years following the original date of issue. Permit expiration shall terminate the source's right to operate unless a timely and complete renewal application has been submitted to the Division at least six (6) months prior to the expiration date of the permit. Upon a timely and complete submittal, the authorization to operate within the terms and conditions of this permit, including any permit shield, shall remain in effect beyond the expiration date, until the renewal permit is issued or denied by the Division [401 KAR 52:020, Section 12].

b. The authority to operate granted shall cease to apply if the source fails to submit additional information requested by the Division after the completeness determination has been made on any application, by whatever deadline the Division sets [401 KAR 52:020, Section 8(2)].

3. Permit Revisions

a. A minor permit revision procedure may be used for permit revisions involving the use of economic incentive, marketable permit, emission trading, and other similar approaches, to the extent that these minor permit revision procedures are explicitly provided for in the State Implementation Plan (SIP) or in applicable requirements and meet the relevant requirements of 401 KAR 52:020, Section 14(2).

b. This permit is not transferable by the permittee. Future owners and operators shall obtain a new permit from the Division for Air Quality. The new permit may be processed as an administrative amendment if no other change in this permit is necessary, and provided that a written agreement containing a specific date for transfer of permit responsibility coverage and liability between the current and new permittee has been submitted to the permitting authority within ten (10) days following the transfer.

SECTION G - GENERAL PROVISIONS (CONTINUED)

4. Construction, Start-Up, and Initial Compliance Demonstration Requirements

Pursuant to a duly submitted application the Kentucky Division for Air Quality hereby authorizes the construction of the equipment described herein, emission units EU01, EU05, EU06, EU07, EU08, EU09, EU10, EU13, EU15, EU16, EU17, EU18, EU19, EU20, EU21, EU22, EU33, EU34, EU35A, EU35B, EU36, EU39, EU40, EU41, EU42, EU43, EU44, EU45, EU46, EU47, EU50, EU51, EU52, EU53, EU57, EU59, EU60, EU61, EU62, EU63, EU64, EU65, EU66, EU67, EU68, EU69, EU71, EU72, EU73, EU74, EU75, EU76; EU77, EU78, EU79, EU80, EU81, and EU82. in accordance with the terms and conditions of permit (V-16-022).

a. Construction of any process and/or air pollution control equipment authorized by this permit shall be conducted and completed only in compliance with the conditions of this permit.

b. Within thirty (30) days following commencement of construction and within fifteen (15) days following start-up and attainment of the maximum production rate specified in the permit application, or within fifteen (15) days following the issuance date of this permit, whichever is later, the permittee shall furnish to the Regional Office listed on the front of this permit in writing, with a copy to the Field Office Branch of the Frankfort Central Office, notification of the following:
   (1) The date when construction commenced.
   (2) The date of start-up of the affected facilities listed in this permit.
   (3) The date when the maximum production rate specified in the permit application was achieved.

c. Pursuant to 401 KAR 52:020, Section 3(2), unless construction is commenced within eighteen (18) months after the permit is issued o or begins but is discontinued for a period of eighteen (18) months or is not completed within a reasonable timeframe then the construction and operating authority granted by this permit for those affected facilities for which construction was not completed shall immediately become invalid. Upon written request, the Cabinet may extend these time periods if the source shows good cause.

d. Pursuant to 401 KAR 50:055, Section 2(1)(a), an owner or operator of any affected facility subject to any standard within the administrative regulations of the Division for Air Quality shall demonstrate compliance with the applicable standard(s) within sixty (60) days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial start-up of such facility. Pursuant to 401 KAR 52:020, Section 3(3)(c), sources that have not demonstrated compliance within the timeframes prescribed in 401 KAR 50:055, Section 2(1)(a), shall operate the affected facility only for purposes of demonstrating compliance unless authorized under an approved compliance plan or an order of the cabinet.

e. This permit shall allow time for the initial start-up, operation, and compliance demonstration of the affected facilities listed herein. However, within sixty (60) days

SECTION G - GENERAL PROVISIONS (CONTINUED)

after achieving the maximum production rate at which the affected facilities will be operated but not later than 180 days after initial start-up of such facilities, the permittee shall conduct a performance demonstration on the affected facilities in accordance with 401 KAR 50:055, General compliance requirements. Testing must also be conducted in accordance with General Provisions G.5 of this permit.

f. Terms and conditions in this permit established pursuant to the construction authority of 401 KAR 51:017 or 401 KAR 51:052 shall not expire.

5. Testing Requirements

a. Pursuant to 401 KAR 50:045, Section 2, a source required to conduct a performance test shall submit a completed Compliance Test Protocol form, DEP form 6028, or a test protocol a source has developed for submission to other regulatory agencies, in a format approved by the cabinet, to the Division's Frankfort Central Office a minimum of sixty (60) days prior to the scheduled test date. Pursuant to 401 KAR 50:045, Section 7, the Division shall be notified of the actual test date at least thirty (30) days prior to the test.

b. Pursuant to 401 KAR 50:045, Section 5, in order to demonstrate that a source is capable of complying with a standard at all times, any required performance test shall be conducted under normal conditions that are representative of the source's operations and create the highest rate of emissions. If [When] the maximum production rate represents a source's highest emissions rate and a performance test is conducted at less than the maximum production rate, a source shall be limited to a production rate of no greater than 110 percent of the average production rate during the performance tests. If and when the facility is capable of operation at the rate specified in the application, the source may retest to demonstrate compliance at the new production rate. The Division for Air Quality may waive these requirements on a case-by-case basis if the source demonstrates to the Division's satisfaction that the source is in compliance with all applicable requirements.

c. Results of performance test(s) required by the permit shall be submitted to the Division by the source or its representative within forty-five days or sooner if required by an applicable standard, after the completion of the fieldwork.

SECTION G - GENERAL PROVISIONS (CONTINUED)

6. Acid Rain Program Requirements

   a. If an applicable requirement of Federal Statute 42 USC 7401 through 7671q (the Clean Air Act) is more stringent than an applicable requirement promulgated pursuant to Federal Statute 42 USC 7651 through 7651o (Title IV of the Act), both provisions shall apply, and both shall be state and federally enforceable.

   b. The permittee shall comply with all applicable requirements and conditions of the Acid Rain Permit and the Phase II permit application (including the Phase II NOx compliance plan and averaging plan, if applicable) incorporated into the Title V permit issued for this source. The source shall also comply with all requirements of any revised or future acid rain permit(s) issued to this source.

7. Emergency Provisions

   a. Pursuant to 401 KAR 52:020, Section 24(1), an emergency shall constitute an affirmative defense to an action brought for the noncompliance with the technology-based emission limitations if the permittee demonstrates through properly signed contemporaneous operating logs or relevant evidence that:
      (1) An emergency occurred and the permittee can identify the cause of the emergency;
      (2) The permitted facility was at the time being properly operated;
      (3) During an emergency, the permittee took all reasonable steps to minimize levels of emissions that exceeded the emissions standards or other requirements in the permit; and
      (4) Pursuant to 401 KAR 52:020, 401 KAR 50:055, and KRS 224.1-400, the permittee notified the Division as promptly as possible and submitted written notice of the emergency to the Division when emission limitations were exceeded due to an emergency. The notice shall include a description of the emergency, steps taken to mitigate emissions, and corrective actions taken.
      (5) This requirement does not relieve the source of other local, state or federal notification requirements.

   b. Emergency conditions listed in General Condition G.7.a above are in addition to any emergency or upset provision(s) contained in an applicable requirement [401 KAR 52:020, Section 24(3)].

   c. In an enforcement proceeding, the permittee seeking to establish the occurrence of an emergency shall have the burden of proof [401 KAR 52:020, Section 24(2)].

8. Ozone Depleting Substances

   a. The permittee shall comply with the standards for recycling and emissions reduction pursuant to 40 CFR 82, Subpart F, except as provided for Motor Vehicle Air Conditioners (MVACs) in Subpart B:
      (1) Persons opening appliances for maintenance, service, repair, or disposal shall comply with the required practices contained in 40 CFR 82.156.

SECTION G - GENERAL PROVISIONS (CONTINUED)

(2) Equipment used during the maintenance, service, repair, or disposal of appliances shall comply with the standards for recycling and recovery equipment contained in 40 CFR 82.158.
(3) Persons performing maintenance, service, repair, or disposal of appliances shall be certified by an approved technician certification program pursuant to 40 CFR 82.161.
(4) Persons disposing of small appliances, MVACs, and MVAC-like appliances (as defined at 40 CFR 82.152) shall comply with the recordkeeping requirements pursuant to 40 CFR 82.166
(5) Persons owning commercial or industrial process refrigeration equipment shall comply with the leak repair requirements pursuant to 40 CFR 82.156.
(6) Owners/operators of appliances normally containing 50 or more pounds of refrigerant shall keep records of refrigerant purchased and added to such appliances pursuant to 40 CFR 82.166.

b. If the permittee performs service on motor (fleet) vehicle air conditioners containing ozone-depleting substances, the source shall comply with all applicable requirements as specified in 40 CFR 82, Subpart B, *Servicing of Motor Vehicle Air Conditioners*.

9. Risk Management Provisions

a. The permittee shall comply with all applicable requirements of 401 KAR Chapter 68, Chemical Accident Prevention, which incorporates by reference 40 CFR Part 68, Risk Management Plan provisions. If required, the permittee shall comply with the Risk Management Program and submit a Risk Management Plan to:

RMP Reporting Center
P.O. Box 10162
Fairfax, VA 22038

b. If requested, submit additional relevant information to the Division or the U.S. EPA.

SECTION H - ALTERNATE OPERATING SCENARIOS

The alternate operating scenarios set forth below have been approved by the Division based on information supplied with the application and during the application review process. The terms and conditions of each alternate operating scenario have been developed to ensure compliance with the applicable regulations. The permittee, when making a change from one operating scenario to another, shall record contemporaneously in a log at the permitted facility a record of the scenario under which the facility is operating. The permit shield, as provided in Section G shall extend to each alternate operating scenario set forth in this Section. All conditions not specified under an alternate operating scenario shall remain unchanged from their permit values or requirements.

ALTERNATE OPERATING SCENARIO 1

During Phase 1 construction, the facility is exempted from 401 KAR 59:225 based on Section 6(3). Prior to starting operation in Phase 2 the facility must find an alternative paint thinner which will contain less VOC (or contain an exempt VOC compound) which at that time will ensure that the coating at the applicators will meet the requirements in 401 KAR 59:225, Section 6(1)(b): Less than 0.42 kg/l of coating (three and five-tenths (3.5) lb/gal) or the facility will comply with the requirements of 401 KAR 59:225, Section 3.

Emission Group 06 – Coating (Phase 1)

Emission Unit 68 (EU68) Paint Booth #1
Description:
Model: Sturm Maschinenbau ZS16
Estimated Start of Construction: August 2016
Maximum Capacity: 28.9 lb post-induction coating/hr
Controls: Paint Booth Filter (CU14)

Emission Unit 69 (EU69) Paint Booth #2
Description:
Model: Sturm Maschinenbau ZS16
Estimated Start of Construction: August 2016
Maximum Capacity: 28.9 lb post-induction coating/hr
Controls: Paint Booth Filter (CU15)

Emission Unit 71 (EU71) Paint Booth #4
Description:
Model: Sturm Maschinenbau ZS16
Estimated Start of Construction: August 2016
Maximum Capacity: 2.38 lb pre-induction coating/hr
Controls: Paint Booth Filter (CU17)

Description: Three (3) paint booths that apply coatings to finished parts. EU 68 and 69 apply a zinc paint to each part and EU71 applies both a zinc paint and a zinc solution. Each of these paint booths are equipped with electrostatic spray nozzles that achieve at least 70% transfer efficiency.

APPLICABLE REGULATIONS:
401 KAR 51:017, Prevention of significant deterioration of air quality.
401 KAR 59:010, New process operations.

SECTION H - ALTERNATE OPERATING SCENARIOS (CONTINUED)

NON-APPLICABLE REGULATIONS:

401 KAR 59:225, New miscellaneous metal parts and products surface coating operations, exempt during Phase 1 since the total potential VOC emissions from all affected facilities constructed in Phase 1 are less than 20 tons per year.

STATE-ORIGIN REQUIREMENTS:

401 KAR 63:020, Potentially hazardous matter or toxic substances, applicable with respect to each affected facility which emits or may emit Xylene, Methanol, or Zinc.

1. **Operating Limitations:**
   a. During Phase 1, the permittee shall not operate EU70.

   b. The permittee shall limit the throughput through EU68 and EU69 to a combined 92.6 tons/yr of post-induction coating on a rolling 12-month basis. [401 KAR 51:017]

   c. The permittee shall limit the throughput through EU71 to 15.5 tons/yr of pre-induction coating on a rolling 12-month basis. [401 KAR 51:017]

   d. The permittee shall limit thinner usage to a combined 4.6 tons/yr of thinner on a rolling 12-month basis. [401 KAR 51:017]

   e. Refer to **Section B**.

2. **Emission Limitations:**
   a. During Phase 1, the permittee shall not allow the combined total VOC emissions from EU68, EU69, and EU71 to exceed twenty (20) tons per year, including mixing, storage, application, drying, clean up, leaks, spills, disposal, processing, and handling. [401 KAR 59:225, Section (6)(3)]

   b. For EU68 and EU69, the permittee shall not cause or contribute to combined total emissions of PM, PM_{10}, and $PM_{2.5}$ that, on a rolling 12-month basis, equal or exceed 0.242 tons of PM, PM_{10}, or $PM_{2.5}$ per year. [401 KAR 51:017]

   c. For EU71, the permittee shall not cause or contribute to total emissions of PM, PM_{10}, and $PM_{2.5}$ that, on a rolling 12-month basis, equal or exceed 0.016 tons of PM, PM_{10}, or $PM_{2.5}$ per year. [401 KAR 51:017]

   d. For EU68 and EU69, the permittee shall not cause or contribute to combined total emissions of VOC (including contributions from thinner usage) that, on a rolling 12-month basis, equal or exceed 14.8 tons of VOC per year. [401 KAR 51:017]

   e. EU71, the permittee shall not cause or contribute to total emissions of VOC that (including contributions from thinner usage), on a rolling 12-month basis, equal or exceed 1.94 tons of VOC per year. [401 KAR 51:017]

   f. Refer to **Section B** and **Section D**.

SECTION H - ALTERNATE OPERATING SCENARIOS (CONTINUED)

ALTERNATE OPERATING SCENARIO 2

In the initial first couple years of Phase 1 production the facility will have intermittent production with a small fraction of the capacity of the total permitted throughput of the facility. Due to the very small process exhaust requirements and intermittent operation, all baghouses with their large design air flow rates cannot be operated at the lower production rates. Subsequently several of the production operations that will be vented to a dedicated baghouse in Phase 2 will initially be ducted to another baghouse during Phase 1. Specifically, the Pouring, Cooling, Shakeout (PCS) Baghouse CU08 will not be constructed until Phase 2. When production demand is anticipated to increase and become continuous in Phase 2 of the project, Baghouse CU08 will be constructed and all process will be ducted as indicated in the original permit application and Section B of the permit (V-16-022 R1)

Temporary Phase 1 process control device routing compared to the Phase 2 design specified above:
- PCS operation emissions previously identified to have been routed and controlled by CU08, will be temporarily routed and controlled by CU01 during Phase 1 operation.
- Core Shop emissions previously identified to have been routed and controlled by CU08, will be temporarily routed and controlled by CU01 during Phase 1 operation.

The permittee may also utilize this alternate operating scenario in the event of a shut down or malfunction of CU08 after Phase 2 is complete.

Foundry Operations

Emission Unit	Description	BACT Control Device	Maximum Hourly Capacity	PSD Operating Limitations	Maximum Burner Capacity	Estimated Start of Construction
Emission Group 02 – Sand Plant						
EU33	Mold Stamping #1	Baghouse (CU01)	99.0 ton green sand/hr, each	358,380 ton green sand/yr	N/A	August 2016
EU34	Mold Stamping #2			358,380 ton green sand/yr	N/A	March 2019
EU36	Sand Classifier		3.70 ton core sand/hr, each	13,380 ton core sand/yr	N/A	August 2016
EU37	Core Silica Sand Bin			13,380 ton core sand/yr	N/A	August 2016
EU38	Core Silica Sand Weigh Hopper			13,380 ton core sand/yr	N/A	August 2016
EU43	Core Removal		3.70 ton core sand/hr	13,380 ton core sand/yr	N/A	August 2016
EU44	Dryer #1		32 lb coating/hr; 34 lb binder/hr, each	34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	August 2016

SECTION H - ALTERNATE OPERATING SCENARIOS (CONTINUED)

Emission Unit	Description	BACT Control Device	Maximum Hourly Capacity	PSD Operating Limitations	Maximum Burner Capacity	Estimated Start of Construction
EU45	Dryer #2	Baghouse (CU01)	32 lb coating/hr; 34 lb binder/hr, each	34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	August 2016
EU46	Dryer #3			34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	March 2019
EU47	Dryer #4			34.35 MMscf/yr; 58.3 ton coating/yr; 60.2 ton binder/yr	4.0 MMBtu/hr	March 2019
Emission Group 03 – Casting & Molding						
EU48	Mold Assembly #1	Baghouse (CU01)	100.8 ton total used sand/hr, each	365,070 ton total used sand/yr	N/A	August 2016
EU49	Mold Assembly #2			365,070 ton total used sand/yr	N/A	March 2019
EU50	Pouring #1		12.7 ton gray iron/hr, each	45,793 ton gray iron/yr	N/A	August 2016
EU51	Pouring #2			45,793 ton gray iron/yr	N/A	March 2019
EU52	Cooling Tunnel		25.3 ton gray iron/hr, each	91,586 ton gray iron/yr & 8.59 MMscf/yr	1 MMBtu/hr	August 2016
EU59	Forced Air Cooler			91,586 ton gray iron/yr	N/A	August 2016

Description: The processes listed above are considered to meet the definition of Foundry Operations, as defined in 40 CFR 63.10906, which means all process equipment and practices used to produce metal castings for shipment, including: Mold or core making and coating; scrap handling and preheating; metal melting and inoculation; pouring, cooling, and shakeout; shot blasting, grinding, and other metal finishing operations; and sand handling.

APPLICABLE REGULATIONS:

401 KAR 51:017, Prevention of significant deterioration of air quality.

401 KAR 59:010, New process operations.

401 KAR 63:002, Section 2(4)(bbbbb) implementing **40 CFR 63, Subpart ZZZZZ,** *National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries Area Sources.*

1. **Operating Limitations:**
   Refer to **Section B**.

2. **Emission Limitations:**
   a. The permittee shall not allow the emissions exiting the following control device to exceed the following: [401 KAR 51:017]

SECTION H - ALTERNATE OPERATING SCENARIOS (CONTINUED)

Control Device (Stack)	Emission Units Controlled	Type of Control and Pollutants Controlled	BACT for PM	BACT for PM_{10}	BACT for $PM_{2.5}$
CU01 (ST02)	EU02, EU04, EU07, EU08, EU09, EU10, EU11, EU12, EU15, EU16, EU33, EU34, EU36, EU37, EU38, EU43, EU44, EU45, EU46, EU47, EU48, EU49, EU50, EU51, EU52, EU59	Baghouse (PM, PM_{10}, $PM_{2.5}$)	0.0010 gr/dscf; 1.42 lb/hr; 6.20 ton/yr	0.0010 gr/dscf; 1.42 lb/hr; 6.20 ton/yr	0.00060 gr/dscf; 0.850 lb/hr; 3.72 ton/yr

Compliance Demonstration:
The permittee shall conduct performance testing on CU01, while operating in this alternate operating scenario to demonstrate initial compliance with the BACT limits listed above. The testing shall be performed according to the requirements of 401 KAR 50:055, and repeated every 5 years. The permittee shall use 40 CFR 60, Appendix A, Method 5 for PM, 40 CFR 51, Appendix M, Method 201A/202 for PM_{10} and $PM_{2.5}$. This testing shall also determine emission factors for each group of units in pounds per MMscf of natural gas used, ton of metal poured, number of parts produced, or other appropriate unifying units as approved by the Division, for use in the equation below. This testing shall be repeated when the remaining units constructed during Phase 2 within the group are completed and operational.

Continuous compliance will be demonstrated by use of the bag leak detection system required in **SECTION E,** meeting the throughput limits for each process in **SECTION B** and **SECTION H**, and calculating the lb/hr and rolling 12-month ton/yr emissions from each group of units, using the following equations:

$$\frac{P_i * EF}{h_i} = H_i$$

And:

$$\sum_{i=1}^{12} H_i * \frac{h_i}{2000} = Y$$

Where:
i = Month;
P_i = Monthly throughput for month *i* in the group of emission units (CU01, CU06, CU08, CU11, and CU13) in units/month;
EF = The corresponding emission factor for PM, PM_{10}, $PM_{2.5}$, CO or VOC as determined using a representative performance test conducted according to the requirements of 401 KAR 50:045, within the last five (5) years, in lb/unit;
h = the total number of hours operated during month *i*;
H_i = total PM, PM_{10}, $PM_{2.5}$, CO or VOC emissions in lb/hr.
Y = Total rolling 12-month yearly emissions in tons/year.
Note: This calculation shall include all emission units that emit PM, PM_{10}, or $PM_{2.5}$ within the group.

b. Refer to **Section B** and **Section D**.

SECTION I – COMPLIANCE SCHEDULE

None

November 21, 2025

Michelle McCloskey
Department of Environmental Protection
Division for Air Quality
300 Sower Boulevard
Frankfort, Kentucky 40601

Subject: Response to Notice of Deficiency dated October 21, 2025
PSD Construction Permit/Title V Operating Permit Application

Permittee Name:	Fritz Winter North America, LP
Source ID:	21-213-00064
Agency Interest:	129745
Activity:	APE20220003
Permit:	V-16-022-R1

Dear Michelle McCloskey:
Please find the following response to the Division for Air Quality (DAQ) Notice of Deficiency dated October 21, 2025.

1. In the first NOD sent to Fritz Winter, the Division requested additional information for grouping EUs 22, 23, 24, 26, 27, 28, 29, 30, 31, 32, 54, 55, 56 into EU 22. The Division considered grouping the previously separate emission units if they operate in sequence and in a continuous manner, based on the definitions of "Emission Unit" and "Affected Facility" in 401 KAR 52:001. Based on the information provided in Figure 2-3 Sand Plant process flow diagram, the Division has grouped the following previously separate emission units into revised combined emission units. The revised emission unit groupings below are based on previously provided throughputs, material processed, sequence of operation and common control equipment. Each of the revised emission units below must be in the permit application and identified separately.:

    a. EUs 22 (Mold Silica Sand Bin) and 26 (Mold Silica Sand Weigh Hopper) consolidated to EU 22 – Mold Silica Sand Handling and Preparation.

    b. EUs 23 (Blend Bin) and 27 (Blend Weigh Hopper) consolidated to EU 23 – Blend Sand Handling and Preparation.

    c. EUs 24 (Bentonite Bin) and 28 (Bentonite Weigh Hopper) will be consolidated into EU 24 – Bentonite Sand Handling and Preparation.

    d. EUs 54 (Sand Cooler), 55 (Used Mold & Core Sand Storage), and 56 (Sand Screening) will be consolidated into EU 54 – Used Sand Handling and Preparation.

    e. EUs 29, 30, 31 and 32 will retain their original designations because these units can operate out of series with the other units and are considered individual units.

Please provide the yearly and hourly uncontrolled potential to emit for each individual revised emission units listed above. This information should be included in the emission calculations and in updated forms DEP7007 B and N. Otherwise, please provide additional information as to how these units operate in series, do not operate independently, and should be grouped into a single source of emissions under EU 22.

Response:
Thank you for the comment and opportunity to clarify.

First, we would like to clarify the term "sand" in 1.b. and c. should be removed as the "Blend" and "Bentonite" do not include "sand."

- **Blend contains finely ground bituminous coal to improve casting surface finish and reduce metal penetration. In addition, the blend acts as a reducing agent to prevent the formation of iron oxides.**
- **Bentonite is a type of clay that creates a bond between the sand grains to provide strength.**

All equipment listed in the permit application [including the preceding identified emission units] as Mold Sand Handling and Preparation (EU22) operate in concert and in a continuous manner when dictated by the needs of the production line. The sole purpose of the identified equipment is to produce a green sand mold with the necessary properties to receive and hold molten iron at approximately 2,500 degrees Fahrenheit.

Specifically, as the pattern is filled with prepared sand at the mold machine [EU-33], the machine may signal for additional prepared sand. Based on that signal, the mixers (i.e., the mullers) are activated to replenish the prepared sand. As part of this muller/mixer operations, the muller calls for a certain amount of new silica sand, blend, bentonite and water. These materials are then combined with reclaimed sand. When the storage locations (the bins) of new sand, blend, bentonite and used sand are running out of material, a signal instructs the pneumatic conveyor fill the day bins from the product silos.

To reclaim the sand, sand is mechanically transferred from shakeout to a number of belt conveyors, screened, cooled and temporarily stored. When requested by the muller, the reclaim sand is added at the muller with the new silica sand, blend, bentonite and water to form prepared sand, that is then conveyed to the mold machine upon request.

The need to fill a pattern results in a request that may require simultaneous operation of all equipment identified in the application as Mold Sand Handling a Preparation (EU22).

Grouping all equipment into a single unit is consistent with US EPA's AP-42: Compilation of Air Emission Factors from Stationary Sources. In particular, equipment to reclaim green sand is shown Figure 12.10-1 and identified as "Sand Handling." Figure 12-10-2 also shows "Sand Preparation" as a single unit receiving sand and

binders from the Silos that are identified within the application as individual emission units.

2. For the emission units controlled by Control Units (CU) 13a-h, 13i, 13j, 21 and 22, the provided uncontrolled potential to emit is less than the controlled potential to emit calculated using the provided grain loading for the control device. This creates a negative control efficiency for PM10 and PM2.5. Please provide supporting data and documents to justify the potential grain loading for each of the control units. Additionally, provide justification for the pre-controlled emission factors used for the correlating emission unit, or revise the pre-control emission calculations. Alternatively, provide documentation of the expected control percentage to use for back calculating pre-control emissions.

Response:
Please recognize the air pollution control devices identified above vent inside the facility and the emissions are assumed to be vented to ambient air via an alternative control device and its associated stack. CU13a-h (Machining Lines Cartridge Collectors), CU13i-CU13j (Perforation Line #2 Cartridge Collector), and Perforation Line #1 Cartridge Collector (CU23) emit inside the Machining Building and presume to be emitted to the ambient air by Fabric Filter CU17 via Stack ST16. Snag Grinder #1 Fabric Filter (CU21) and Snag Grinder #2 Fabric Filter (CU22) are filtered socks. These emissions are vented to ambient air via Baghouse CU11 and Stack CU12. This information is shown in Table 2-3 of the application.

The emission estimation methodology that results in the negative control efficiency was discussed in Sections 3.1.1 and 3.2 of the permit application. Given the BACT determinations are based on outlet grain loading, to attempt to equalize the total emissions resulting from the "outlet grain loading and air volumes" method and "emission factor/assumed control efficiencies" the following methodology was used:

The control efficiency of each air pollution control device was determined by using the particulate emissions determined via the outlet grain loading methodology (i.e., the "controlled emissions") and the calculated uncontrolled emissions from each operation using emission factors (i.e. the "uncontrolled emissions") that are subsequently vented to that control device). This resulted in the overall control efficiency for each air pollution control device that was then applied to each emission unit vented to that particular control device.

The above method was used as an alternative to using an assumed control efficiency of greater than 99% for each operation as vendors rarely provide control efficiency information as control efficiency is based on inlet conditions that are unknown at the time of permitting. CU13a-h (Machining Lines Cartridge Collectors), CU13i-CU13j (Perforation Line #2 Cartridge Collector), and Perforation Line #1 Cartridge Collector (CU23) were part of the original permit application and the issued and subsequently revised air permit.

Snag Grinder #1 Fabric Filter (CU21) and Snag Grinder #2 Fabric Filter (CU22) are filtered socks with no available control efficiency identified. It could be presumed that

an appropriate control efficiency of 98% can be used prior to control by Fabric Filter CU21 and CU22.

3. According to past emission calculations for EUs 44 and 45, Core Dryer #1 and #2, coating and binder used in the core are potential sources of VOC. The permit states that the core dryers have an operating limit of 58.3 tons per year of coating and 60.2 tons of binder per year. Neither the provided emission calculations nor form DEP7007N include potential VOC emissions generated from drying the cores. Currently, the only source of VOC provided in the application for EUs 44 and 45 is from natural gas combustion. Please provide uncontrolled potential emissions for VOC and associated HAPs from the coating and binder. Otherwise, please provide additional information for removing Binder and Coating as potential sources of VOC from EU 44 and 45.

   Response:
   Emissions from the binder, catalyst, and core release are quantified with PUCB Core Machine #1 (EU39) and PUCB Core Machine #2 (EU40). See pages 45 through 56 of Appendix D.

   VOC emissions generated from the coating of cores are attributed to Core Wash Station #1 (EU43) and Core Wash Station #2 (EU79) [i.e., VOC emissions are assumed emitted prior to drying]. See pages 57 and 117 of 169 in Appendix D. Whether the emissions are emitted at the core wash stations or at the dryers, both are vented to Baghouse CU08 (and Stack ST09).

4. According to past emission calculations for EU 15, Pouring Furnace #1, the tons of metal processed by an electric induction furnace is a source of PM emissions. Historical PM emission factors for EU 15 are from AP-42 Chapter 12.10, Table 12.10-3 for electric induction furnaces. Neither the provided emission calculations or form DEP7007N include potential PM emissions from the tons of metal processed by this unit. Currently, the emission calculations show that the only source of PM coming from EU 15 is from natural gas combustion. Please provide an updated emission calculation for EU 15 that includes the uncontrolled potential to emit from tons of metal processed.

   Response:
   The previous emission factor used for electric induction furnaces was in error. The 0.9 lb/ton of metal identified from AP-42, Chapter 12.10, Table 12.10-7 is for the melting of scrap in an electric induction furnace. The pouring furnaces only hold molten metal produced at the electric induction furnaces (EU07 through EU10) where the 0.9 lb/ton of metal is an appropriate emission factor. See the third paragraph of AP-42 Section 12.10.2.2.1 for a description of the electric induction furnace used to melt metal as well as Figure 12.10-1 that identifies the metal melting induction furnace as SCC 3-04-003-03 which corresponds to the 0.9 lb/ton emission factor.

5. According to past emission calculations for EU 50, Pouring #1, the lbs of binder processed by is a source of HAPs emissions. Historical HAPs emission factors for EU 50 are from "A Phenolic Urethane Binder System for PCS", Technikon, May 2007. Neither the provided emission calculations nor form DEP7007N include potential HAPs emissions from the lbs of binder processed by this unit. Please provide an updated emission calculations for EU 50

that includes any changes to the total amount of binder processed by the unit. Otherwise, please provide additional information justifying removing the binder usage as a potential source of HAP from EU 50.

Response:
HAPs from Pouring, Cooling and Shakeout are shown in Pages 69 through 72 of 169 of Appendix D.

6. EU 61 is missing potential emissions from abrasive steel shot used to clean castings. PM emissions from shot blasting are dependent on both the abrasive steel shot, and the targeted surface of the casting. Currently, the potential to emit calculations for EU 61 only include the PM emissions generated from the tons of metal processed by the shot blasting machine. Please provide uncontrolled emission calculations for the abrasive steel shot, as well as hourly and yearly maximum capacity of steel shot used by EU 61.

Response:
Unlike other abrasive blasting, the particulate emission from Shotblasting (EU61) is determined by the amount of metal processed and not shot used. Please see the document "An Inventory of Iron Foundry Emissions" provided in Appendix V of the application. This document is the basis for the emission factor identified in USEPA's WebFIRE under SCC 30400340 or AP-42 Table 12.10-7. The Gutow emission rates for blasting is 15.5 lb/ton and the grinding is 1.6 lb/ton equating to 17.1 lb/ton or equivalent to the 1.70+1 lb/ton gray iron produced.

7. Page 362 of the application states that the emissions from EU 35A and 35B emit through ST09, but Page 363 of the application states that they are fugitive emissions. Please provide additional information about the emissions from these units, and how they are processed and released into the atmosphere.

Response:
Core Silica Sand Silo A (EU35A) and Core Silica Sand Silo B (EU35B) use passive bin vents to control emissions of particulate matter during pneumatic filling. Any particulate emissions that pass through the bin vent filter emit into the building and is captured by the Core/Mold Baghouse (CU08) and emitted out of Stack ST09.

8. For the Coating Lines, on page 31 of the application, it states that FWNA is exempted from the VOC standards of 401 KAR 59:225, Section 3, because the VOC content of Worwags Coatings LLC Zinc Dust Primer is 3.42 lbs/gallon. However, the Worwags Coatings LLC Reducing Solvent Blend for WG102992 TDS provided in the application for Paint Lines #2 and #3 has a VOC content of 7.26 lbs/gallon. Please provide the calculations for the VOC of the coating (as used) that demonstrates that the combined VOC content, excluding water or exempt solvent or both, of the coating and thinner delivered to applicators is the less than 3.5 lb/gal, as required by 401 KAR 59:225, Section 6(1)(b). If solvent is exempted from this calculation under the definition for "exempt solvent" in 401 KAR 59:001, provide justification for that exemption.

Response:
Following review, please find the following VOC content (as applied):

Material	Parts by Volume	Density (lb/gal)	VOC Content (lb/gal)
Zinc Dust Primer	98.00	25.65	3.41
Reducer	2.00	7.29	7.29

Convert parts by volume to gallons (assuming 1 part = 1 unit volume):

$$\text{Volume of Primer} = \frac{98.00}{100.00} \times 1\ \text{gal} = 0.98\ \text{gal}$$

$$\text{Volume of Reducer} = \frac{2.00}{100.00} \times 1\ \text{gal} = 0.02\ \text{gal}$$

Calculate VOC contribution:

$$\text{VOC}_{\text{Primer}} = 0.98 \times 3.41 = 3.34\ \text{lb}$$

$$\text{VOC}_{\text{Reducer}} = 0.02 \times 7.29 = 0.15\ \text{lb}$$

Total VOC

$$\text{Total VOC} = 3.34 + 0.15 = 3.49\ \text{lb per gallon of mixture}$$

Please contact me at curtis.mabry@fritzwinter.us or at (270) 813-4000 should you have any questions regarding the attached response.

Respectfully submitted,

Curtis Mabry
EHS Manager

08497 Plattner Rd | New Bremen, OH 45869 | (614) 425-6392
madriverstrategies.com

mad river strategies llc

February 21, 2022

Eddie Butler
EHS Manager
Fritz Winter North America LP
1 Fritz Winter Drive
Franklin, KY 42134

Hauke May
Project Manager
Fritz Winter North America LP
1 Fritz Winter Drive
Franklin, KY 42134

Subject: Perforation Line #1 - Minor Permit Revision Application
Fritz Winter North America, LP (Agency Interest No. 129745)
Franklin, Kentucky

Dear Mr. Butler and Mr. May,

At your request, please find the attached minor permit revision application package to allow the installation of Perforation Line #1 (EU84) at the Fritz Winter North America, LP (FWNA) operation located at 1 Fritz Winter Drive in Franklin (Simpson County), Kentucky. The application requests the emission unit be incorporated by a revision of the existing PSD/Title V Air Quality Permit V-16-022-R1 (Air Permit) issued on November 25, 2017.

Project Background
The FWNA facility located in Franklin, Kentucky will install Perforation Line #1 (EU84) to accommodate the production of parts for a new customer. Products machined at the Perforation Line #1 (EU84) will be cast at the existing facility.

Emissions from the Perforation Line #1 (EU84) will be exhausted to the Perforation Line #1 Cartridge Collector (CU23) that will be installed as part of this project. The emissions from the Perforation Line #1 Cartridge Collector (CU23) emit indoors. Due to the environmentally controlled production environment (using closed loop recirculation) it is assumed CU23 stack emissions are subsequently captured by Paint Line #1 Booth Filter (CU17) and emitted via stack ST16.

A Process Flow Diagram (PFD) is provided as Figure 1-1 in Appendix A of this letter.

Emission Calculations
Emission calculations are provided in Appendix B. As installation of Perforation Line #1 (EU84) does not debottleneck any existing operations nor does any existing operation experience an emission increase because of the operation, emission calculations are confined to Perforation Line #1 (EU84).

Controlled emissions are shown in Appendix B-1 and uses maximum air volume and outlet grain loading [guarantee by supplier] to estimate hourly emissions. Annual emissions are calculated based on the hourly emission rate and 8,760 hours per year. There are no expected fugitive emissions from the installation and any supplemental particulate filtration from Paint Line #1 Booth Filter (CU17) has not been considered in the emission calculations.

Uncontrolled emissions are quantified using emission factors as identified in the Appendix B-2 worksheet. For PM10 and PM2.5, the combination of the uncontrolled emission factor, production rate, outlet grain loading and air volume result in the uncontrolled emissions being less than the controlled emission rates.

Applicable Requirements
Given the installation and the emission calculations, the installation will comply with all KDAQ regulations. Regulations applicable to this project are identified in Form DEP7007V.

Application Package
All required KDAQ Forms are provided in Appendix C. Please ensure the Responsible Official signs the Administrative Information Form (DEP7007AI) and the Insignificant Activities Form (From DEP7007DD). For completeness, please consider submitting this cover letter and package to KDAQ.

Should you have any questions regarding this application package, please contact me at craig.schmeisser@madriverstrategies or 614.425.6392.

Respectfully submitted,

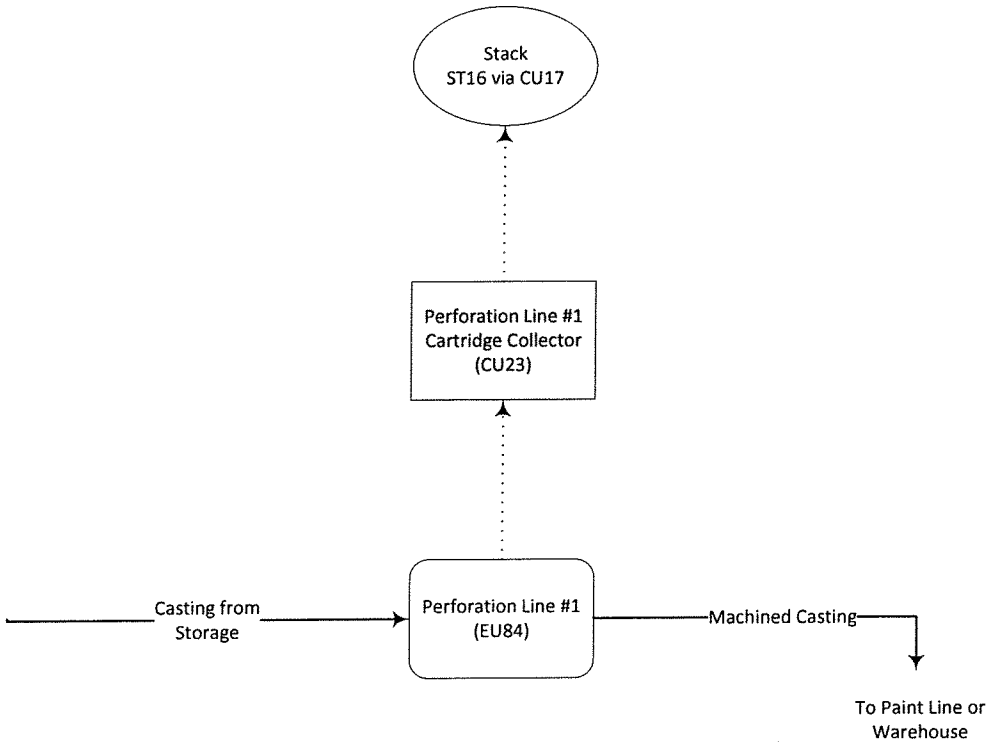
Craig S. Schmeisser
Senior Project Consultant

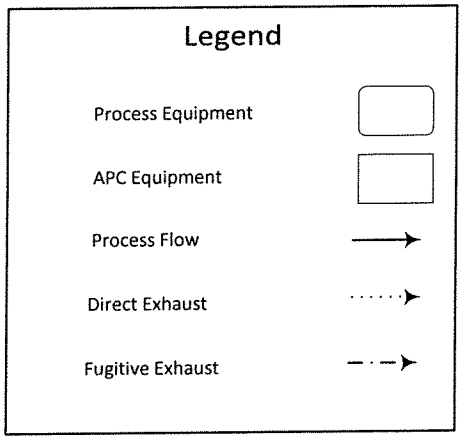
Copy to: Naomi Allen – FWNA
Joseph McCarty - FWNA

Appendix A
Process Flow Diagram

Fig 1.1 – Perforation Line #1
Fritz Winter North America, LP – Franklin, KY

Process Flow Diagram





Appendix B
Emission Calculations

Controlled Emission Calculations
Perforation Line #1 Installation
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
13,863 Tons/Year Note 6

Maximum Hourly Capacity
1.58 Tons/Hour Note 5

Flow Diagram Designation
Perforation Line #1 (Controlled)
EU84

Process Description:
Fritz Winter North America, LP
Perforation Line #1 (Controlled)

Control Device: CU23 Note 9
SCC Code:
Control Device Outlet: 0.005 gr/dscf Note 8
Airflow: 1,500 acfm Note 7
Stack Gas Temperature: 70 °F

Facility Process Name:		Criteria Pollutants								
Perforation Line #1 (Controlled)										
Emission Factor Basis:		PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 3			Note 4			
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.064	0.064	0.064						
Annual (TPY)		0.282	0.282	0.282						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.064	0.064	0.064						
Annual (TPY)		0.282	0.282	0.282						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10
Note 4: No VOCs are expected from this emission unit.
Note 5: Potential hourly equipment machining rate based on 48 second cycle time and 42.2 lbs/casting
Note 6: Potential annual machining rate based on potential hourly rate and 8,760 hours per year
Note 7: Maximum air volume of control device. Air pollution control device emits indoors.
Note 8: Manufacturer performance guarantee.
Note 9: Given building ventilation, it is assumed emissions from the Perforation Line #1 Cartridge Collector (CU23) are emitted via control device CU17 stack ST16.

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Uncontrolled Emission Calculations
Perforation Line #1 Installation
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
13,863 Tons/Year Note 6

Maximum Hourly Capacity
1.58 Tons/Hour Note 5

Flow Diagram Designation
Perforation Line #1 (Uncontrolled)
EU84

Process Description:
Fritz Winter North America, LP
Perforation Line #1 (Uncontrolled)
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm
Stack Gas Temperature: °F

Facility Process Name:		Criteria Pollutants								
Perforation Line #1 (Uncontrolled)										
Emission Factor Basis:		PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:	lb/ton	1.60	0.0045	0.0045						
(source)		Note 1	Note 2	Note 2			Note 4			
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)		2.532	0.007	0.007						
Annual (TPY)		11.090	0.031	0.031						
Total Emission Rate:										
Hourly (lb/hr)		2.532	0.007	0.007						
Annual (TPY)		11.090	0.031	0.031						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Emission factor from Bernard S. Gutow article
Note 2: Emission factor from FIRE 6.25 SCC 3-04-003-60
Note 3: Assumes PM2.5 is equal to PM10
Note 4: No VOCs are expected from this emission unit.
Note 5: Potential hourly equipment machining rate based on 48 second cycle time and 42.2 lbs/casting
Note 6: Potential annual machining rate based on potential hourly rate and 8,760 hours per year

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Appendix C
Forms

1. DEP7007AI
2. DEP7007B
3. DEP7007N
4. DEP7007GG
5. DEP7007V
6. DEP7007DD

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information

___ Section AI.2: Applicant Information

___ Section AI.3: Owner Information

___ Section AI.4: Type of Application

___ Section AI.5: Other Required Information

___ Section AI.6: Signature Block

___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

___ Additional Documentation attached

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 2/15/2022

Section AI.1: Source Information

Physical Location Address: Street: 1 Fritz Winter Drive; City: Franklin; County: Simpson; Zip Code: 42134

Mailing Address: Street or P.O. Box: 1 Fritz Winter Drive; City: Franklin; State: KY; Zip Code: 42134

Standard Coordinates for Source Physical Location

Longitude: 36.79749 (decimal degrees) **Latitude:** -86.554991 (decimal degrees)

Primary (NAICS) Category: Motor Vehicle Brake System Mfg. **Primary NAICS #:** 336340

Classification (SIC) Category: Motor Vehicle Parts and Accessories **Primary SIC #:** 3714

Briefly discuss the type of business conducted at this site: The casting and machining of iron parts for the automotive industry.

Description of Area Surrounding Source: ☐ Rural Area ☑ Industrial Park ☐ Residential Area ☐ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employees: 300

Approximate distance to nearest residence or commercial property: *0.4 miles*

Property Area:

Is this source portable? ☐ Yes ☑ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☑ Currently Hold	☐ Need	☐ N/A
RCRA:	☑ Currently Hold	☐ Need	☐ N/A
UST:	☐ Currently Hold	☐ Need	☑ N/A

Type of Regulated Waste Activity: ☐ Mixed Waste Generator ☑ Generator ☐ Recycler ☐ Other: ☐ U.S. Importer of Hazardous Waste ☐ Transporter ☐ Treatment/Storage/Disposal Facility ☐ N/A

Section AI.2: Applicant Information

Applicant Name: Fritz Winter North America, LP

Title: (if individual)

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** KY **Zip Code:** 42134

Email: (if individual)

Phone: (270) 813-4000

Technical Contact

Name: Hauke May

Title: Project Manager

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** Kentucky **Zip Code:** 42134

Email: hauke.may@fritzwinter.us

Phone: (270) 813-4000

Air Permit Contact for Source

Name: Eddie Butler

Title: EHS Manager

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** Kentucky **Zip Code:** 42134

Email: eddie.butler@fritzwinter.us

Phone: (270) 813-4000

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name:

Title:

Mailing Address: **Street or P.O. Box:**
City: **State:** **Zip Code:**

Email:

Phone:

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☐ Significant Revision	☐ Administrative Permit Amendment
☐ Renewal Permit	☐ Revised Registration	☑ Minor Revision	☐ Initial Source-wide OperatingPermit
☐ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☐ Revision	☐ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☑ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☑ Yes ☐ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☑ Particulate Matter	33.91	☑ Single HAP	9.9
☑ Volatile Organic Compounds (VOC)	112.45	☑ Combined HAPs	24.9
☑ Carbon Monoxide	312.39	☐ Air Toxics (40 CFR 68, Subpart F)	
☑ Nitrogen Oxides	39.9	☐ Carbon Dioxide	
☑ Sulfur Dioxide	39.9	☐ Greenhouse Gases (GHG)	
☑ Lead	0.59	☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* _____ **Proposed Operation Start-Up Date:** *(MM/YYYY)* _____

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)* 06/2022 **Proposed Operation Start-Up Date:** *(MM/YYYY)* 07/2022

Applicant is seeking coverage under a permit shield. ☐ Yes ☑ No **Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.**

Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

☐ DEP7007A Indirect Heat Exchangers and Turbines	☐ DEP7007CC Compliance Certification
☑ DEP7007B Manufacturing or Processing Operations	☑ DEP7007DD Insignificant Activities
☐ DEP7007C Incinerators and Waste Burners	☐ DEP7007EE Internal Combustion Engines
☐ DEP7007F Episode Standby Plan	☐ DEP7007FF Secondary Aluminum Processing
☐ DEP7007J Volatile Liquid Storage	☑ DEP7007GG Control Equipment
☐ DEP7007K Surface Coating or Printing Operations	☐ DEP7007HH Haul Roads
☐ DEP7007L Mineral Processes	☐ Confidentiality Claim
☐ DEP7007M Metal Cleaning Degreasers	☐ Ownership Change Form
☑ DEP7007N Source Emissions Profile	☐ Secretary of State Certificate
☐ DEP7007P Perchloroethylene Dry Cleaning Systems	☑ Flowcharts or diagrams depicting process
☐ DEP7007R Emission Offset Credit	☐ Digital Line Graphs (DLG) files of buldings, roads, etc.
☐ DEP7007S Service Stations	☐ Site Map
☐ DEP7007T Metal Plating and Surface Treatment Operations	☐ Map or drawing depicting location of facility
☑ DEP7007V Applicable Requirements and Compliance Activities	☐ Safety Data Sheet (SDS)
☐ DEP7007Y Good Engineering Practice and Stack Height Determination	☐ Emergency Response Plan
☐ DEP7007AA Compliance Schedule for Non-complying Emission Units	☑ Other: ___ Calcs
☐ DEP7007BB Certified Progress Report	

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.

[signature] **Authorized Signature** 2-21-22 **Date**

Darryl Konsler **Type or Printed Name of Signatory** CEO **Title of Signatory**

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations
Form identifies revised technical and environmental contact.
AI.4 - Permit shield is not available for minor permit revisions per 401 KAR Chapter 52 Section 14 (5)

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007B

Manufacturing or Processing Operations

___ Section B.1: Process Information
___ Section B.2: Materials and Fuel Information
___ Section B.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.
___ Attach a flow diagram
___ Attach SDS

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 2/15/2022

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU84	Perforation Line #1	Machining of iron castings	EU84	Perforation Line #1	EMAG EMAG EMAG Hofmann	Model VL-8 Model VL-8 NK Model BVW11-FH2	06/2022	Continuous	N/A	N/A

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU84	Perforation Line #1	Casting	3165	lbs	1.5825	Casting	3165	lbs	None	N/A	N/A	N/A	N/A	N/A	N/A

Section B.3: Notes, Comments, and Explanations

See Process Flow Diagram for additional information.

Division for Air Quality

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(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 2/16/2022

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
EU84	Perforation Line #1	EU84	Perforation Line #1	Perforation Line #1 Cartridge Collector	CU23	ST16	1.58 tons	PM PM_{10} $PM_{2.5}$	1.60 lb/ton 0.0045 lb/ton 0.0045 lb/ton	Bernard S. Gutow WebFire SCC 3-04-003-60 WebFire SCC 3-04-003-60	100.00%	99+%	2.532 0.007 0.007	0.064 0.064 0.064	11.09 0.031 0.031	0.282 0.282 0.282

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
ST16	Control Device ID: CU17 Emission Unit ID(s): EU66, EU67, EU71, EU82, EU84	1.1	46.6	0	4072424	539704	2718	113	49.2

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU84	Perforation Line #1	EU84	Only stack emissions are expected	Only stack emissions are expected	Only stack emissions are expected	Only stack emissions are expected	Only stack emissions are expected	Only stack emissions are expected

Section N.4: Notes, Comments, and Explanations

The stack for Perforation Line #1 Cartridge Collector (CU23) emits indoors. Due to the environmentally controlled production environment (using closed loop recirculation) it is assumed CU23 stack emissions are subsequently captured by Paint Line #1 Booth Filter (CU17) and emitted via stack ST16.

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

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DEP7007GG

Control Equipment

Additional Documentation

___ Complete Sections GG.1 through GG.12, as applicable

___ Attach manufacturer's specifications for each control device

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 2/17/2022

Section GG.1: General Information - Control Equipment

Control Device ID #	Control Device Name	Cost	Manufacturer	Model Name/ Serial #	Date Installed	Inlet Gas Stream Data For All Control Devices					Inlet Gas Stream Data For Condensers, Adsorbers, Afterburners, Incinerators, Oxidizers Only			Equipment Operational Data For All Control Devices		
						Temperature (°F)	Flowrate (scfm @ 68 °F)	Average Particle Diameter (μm)	Particle Density (lb/ft^3) or Specific Gravity	Gas Density (lb/ft^3)	Gas Moisture Content (%)	Gas Composition	Fan Type	Pressure Drop Range ($in. H_2O$)	Pollutants Collected/ Controlled	Pollutant Removal (%)
CU23	Perforation Line #1 Cartridge Collector	--	LTA Industrial Cleaning	LTA Model DF 2000-Jet	Jun-22	70.0	1500	N/K	N/K	N/K	N/A	N/A	N/A	0.5-10.0	Particulate Matter	99+

Section GG.6: Filter

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Filter	Identify Type of Filter Unit: Baghouse, Cartridge Collector, or Other (specify)	Identify Type of Filtering Material: Fabric, Paper, Synthetic, or Other (specify)	Total Filter Area (ft^2)	Effective Air-to-Filter Ratio ($acfm/ft^2$)	Continuous Monitoring Instrumentation (e.g. COMS, BLDS, none)	Additional Materials Introduced into the Control System (e.g. lime, carbon)		Identify Cleaning Method: Shaker, Pulse Air, Reverse Air, Pulse Jet, or Other (specify)	Identify Gas Cooling Method: Ductwork, Heat Exchanger, Bleed-in Air, Water Spray, or Other (specify)	For Ductwork:		For Bleed-in Air:	For Water Spray:
							Material	Injection Rate (lb/hr)			Length (ft)	Diameter (ft)	Flowrate (scfm @ 68°F)	Flowrate (gal/min)
CU23	EU84	Catridge Collector	Fabric	NK	NK	Magnahelic	NA	NA	Pulse Jet	Ductwork	NK	NK	NA	NA

Section GG.12: Notes, Comments, and Explanations

The stack for Perforation Line #1 Cartridge Collector (CU23) emits indoors. Due to the environmentally controlled production environment (using closed loop recirculation) it is assumed CU23 stack emissions are subsequently captured by Paint Line #1 Booth Filter (CU17) and emitted via stack ST16.

Division for Air Quality

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DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirements
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation
___ Complete DEP7007AI

Source Name: Fritz Winter
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 2/17/2022

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
EU84	Perforation Line #1	401 KAR 59:010 Section 3(2)	PM	4.77 lb/hr	0.005 gr/dscf or 0.064 lb/hr ($PM_{10}/PM_{2.5}$)	Process exhausted to Cartridge Collector (CU23)	APCD operating - process vented to cartridge collector
EU84	Perforation Line #1	401 KAR 59:010 Section 3(1)(a)	Opacity	20% opacity	N/A	Process exhausted to Cartridge Collector (CU23)	APCD operating - process vented to cartridge collector

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
EU84	Perforation Line #1	PM	401 KAR 59:010 Section 3(2)	Pressure Drop	Pressure drop will insure the air pollution control device is operational.
EU84	Perforation Line #1	Opacity	401 KAR 59:010 Section 3(1)(a)	Pressure Drop	Pressure drop will insure the air pollution control device is operational and the opacity standard is met.

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
EU84	Perforation Line #1	PM	401 KAR 59:010 Section 3(2)	Pressure Drop	Pressure drop will insure the air pollution control device is operational.
EU84	Perforation Line #1	Opacity	401 KAR 59:010 Section 3(1)(a)	Pressure Drop	Pressure drop will insure the air pollution control device is operational and the opacity standard is met.

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
EU84	Perforation Line #1	PM	401 KAR 59:010 Section 3(2)	Pressure Drop	See Section F of Permit Number V-16-022 R1
EU84	Perforation Line #1	Opacity	401 KAR 59:010 Section 3(1)(a)	Pressure Drop	See Section F of Permit Number V-16-022 R1

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
EU84	Perforation Line #1	PM	401 KAR 59:010 Section 3(2)	PM	Method 5, if requested
EU84	Perforation Line #1	Opacity	401 KAR 59:010 Section 3(1)(a)	Opacity	Method 9, if requested

Section V.6: Notes, Comments, and Explanations
Emissions from Perforation Line #1 are routed to Perforation Line #1 Cartidge Collector (CU23). Due to required process environmental control needs, the Machining Building only recirculates air back into the facility. Stack emissions from Perforation Line #1 Cartridge Collector (CU23) are assumed to be captured by Paint Line #1 Fabric Filter (CU17) and discharged via stack ST16.

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DEP7007DD

Insignificant Activities

___ Section DD.1: Table of Insignificant Activities
___ Section DD.2: Signature Block
___ Section DD.3: Notes, Comments, and Explanations

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 2/17/2022

Section DD.1: Table of Insignificant Activities

*Identify each activity with a unique Insignificant Activity number (IA #); for example: 1, 2, 3... etc.

Insignificant Activity #	Description of Activity including Rated Capacity	Serial Number or Other Unique Identifier	Applicable Regulation(s)	Calculated Emissions
None	N/A	N/A	N/A	N/A

Section DD.2: Signature Block

I, THE UNDERSIGNED, HEREBY CERTIFY UNDER PENALTY OF LAW, THAT I AM A RESPONSIBLE OFFICIAL, AND THAT I HAVE PERSONALLY EXAMINED, AND AM FAMILIAR WITH, THE INFORMATION SUBMITTED IN THIS DOCUMENT AND ALL ITS ATTACHMENTS. BASED ON MY INQUIRY OF THOSE INDIVIDUALS WITH PRIMARY RESPONSIBILITY FOR OBTAINING THE INFORMATION, I CERTIFY THAT THE INFORMATION IS ON KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE OR INCOMPLETE INFORMATION, INCLUDING THE POSSIBILITY OF FINE OR IMPRISONMENT.

By:

Authorized Signature	Date
Darryl Konsler	CEO
Type/Print Name of Siguatory	Title of Siguatory

Section DD.3: Notes, Comments, and Explanations

No additional insignificant emission units will be installed as part of this project.

Emission Group 11 – Perforation Line #1
Description: Machining of iron castings

Emission Unit 84 (EU84) Perforation Line #1
Manufacturer/Model: Not Determined
Estimated Start of Construction: June 2022
Maximum Capacity: 1.58 tons castings per hour; 13,863 tons castings per year
Controls: Perforation Line #1 Cartridge Collector (CU23)

APPLICABLE REGULATIONS:
401 KAR 51:010, New Process Operations
401 KAR 63:010, Potentially hazardous matter or toxic substances

1. Operating Limitations:

a. Perforation Line #1 (EU84) shall not operate unless Perforation Line #1 Cartridge Collector (CU23) is operating so the emission and opacity limits set forth below are not exceeded. Perforation Line #1 controls are interlocked with Perforation Line #1 Cartridge Collector [401KAR 63:010].

2. Emission Limitations:

a. For emissions from a control device or stack no person shall cause, suffer, allow or permit the emission into the open air of particulate matter from any affected facility which is in excess of the following: [401 KAR 59:010, Section 3(2)]

i. For process weight rates of 0.50 tons/hr or less: 2.34 lb/hr
ii. For process weight rates up to 30 tons/hr: $E=3.59P^{0.62}$
iii. For process weight rates greater than 30 tons/hr: $E=17.31P^{0.16}$

Where E=the allowable particulate emissions rate in pounds/hour)
P=the process rate in tons per hour

b. No person shall cause, suffer, allow, or permit any continuous emissions into the open air from a control device or stack associated with any affected facility which is equal to or greater than twenty (20) percent opacity. [401 KAR 63:010, Section 3(1)]

c. Hourly and annual emissions shall not exceed the following:

Emission Unit	PM/PM10/PM2.5 (lb/hr);(ton/yr)	VOC (lb/hr);(ton/yr)
EU84	0.06 lb/hr; 0.28 tpy	N/A

3. Testing Requirements:

Testing shall be conducted at such times as may be required by the Cabinet in accordance with 401 KAR 50:045.

4. Specific Monitoring Requirements:

a. For each emission unit listed above, the permittee shall monitor the following parameters:

i. Monthly and 12-month rolling total hours of operation;

ii. Monthly and 12-month rolling total emissions of PM, PM10 and PM2.5.

5. Specific Recordkeeping Requirements:

a. Records of the monthly and twelve-month rolling total emissions of PM, PM10 and PM2.5 shall be maintained.

6. Specific Reporting Requirements:

Refer to SECTION F.

7. Specific Control Equipment Operating Conditions:

a. A monitoring device (differential pressure gauges or manometers) shall be installed to determine the pressure drop across the cartridge collector at a minimum of once per day. A permanent label displaying the operating range established shall be posted next to the selected instrument.

b. The permittee shall maintain documentation detailing the operation and maintenance of the cartridge collector.

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mad river strategies llc

February 16, 2022

Eddie Butler
EHS Manager
Fritz Winter North America LP
1 Fritz Winter Drive
Franklin, KY 42134

Naomi Allen
Project Engineer
Fritz Winter North America LP
1 Fritz Winter Drive
Franklin, KY 42134

Subject: Rotary Sprue Cleaner and Return Conveyors - Minor Permit Revision Application
Fritz Winter North America, LP (Agency Interest No. 129745)
Franklin, Kentucky

Dear Mr. Butler and Ms. Allen,

At your request, please find the attached minor permit revision application package to allow the installation of a Rotary Sprue Cleaner and Return Conveyors at the Fritz Winter North America, LP (FWNA) operation located at 1 Fritz Winter Way in Franklin (Simpson County), Kentucky. The application requests the emission unit be incorporated by a revision of the existing PSD/Title V Air Quality Permit V-16-022-R1 (Air Permit) issued on November 25, 2017.

Project Background
To allow the transmittal of this air permit application package more easily to the Kentucky Division for Air Quality, I have incorporated the following project background.

As authorized by the Air Permit, Fritz Winter North America LP (FW) constructed and operates a gray iron foundry and machining operation to produce automotive parts, predominantly brake rotors. The facility is located in the Wilkey North Industrial Park located in Franklin, Simpson County, Kentucky. The facility is located approximately five miles north of Franklin and thirteen miles south of Bowling Green along State Route 31W. The existing operations and the installation of the Rotary Sprue Cleaner and Return Conveyors are discussed in the section.

Following the melting operation conducted in Electric Induction Furnaces (EU07-EU11), molten metal is transferred to one of two Pouring Furnaces (EU15/EU16). Once the sand mold is in position, molten metal from a pouring furnace is introduced to the mold cavity through a series of passages. Molten metal via Pouring #1/#2 (EU50/EU51) enters the pouring basin or sprue cup where molten metal is received by the sand mold. Molten metal then travels through a vertical passage identified as a sprue and is directed horizontally towards the mold cavity via a "runner." Finally, the molten metal enters the mold cavity via a "gate." Collectively the sprue cup, sprue, runner, and gate may be identified as "sprue."

Following the pouring operation, the molten metal filled mold enters Mold Cooling (EU52) where metal solidifies in the sprue and in the mold cavity (i.e., the casting). Following Mold Cooling (EU52), the sprue is separated from the casting at the Shakeout Conveyor (EU53). The bulk of the mold sand is separated

from the casting and sprue at the Shakeout Conveyor and transferred to the Mold Sand Handling and Preparation (EU22) emission unit.

Following the Shakeout Conveyor both the casting, sprue and residual sand enter the Casting Cooling (EU59) conveyor. The casting is then separated from the sprue and residual sand at the Sorting Conveyor (EU60), with the casting directed to one of two existing Steel Shot Blasting units (EU61/EU62).

With this installation a Rotary Sprue Cleaner (EU83) will be installed following the Sorting Conveyor (EU60) to receive the sprue and sand. The liner of the Rotary Sprue Cleaner is equipped with weirs that cause the material to tumble in the drum. The continued agitation of the sprue causes the adhering sand to separate from the sprue. The sand (sand removed the casting along with the residual sand) and small metallics will be discharged to a series of Return Conveyors (EU83) that will eventually transfer the sand to an existing metal separation system that is near the existing Shakeout (EU53).

The cleaned sprue will exit onto a belt and then to a temporary storage location prior to being returned to the Charge Handling (EU01) where the sprue will be remelted with other charge materials in one of the four Electric Induction Furnaces (EU07-EU10).

Emissions from the Rotary Sprue Cleaner and Return Conveyors (EU83) will be exhausted to two existing baghouses, Core/Mold Baghouse (CU08) and Fettling Baghouse (CU11). No additional baghouses or air volumes will be needed to exhaust the particulate matter.

A Process Flow Diagram (PFD) is provided as Figure 1-1 in Appendix A of this letter. For completeness, the PFD shows the dust silos and filters, along with other existing equipment. This equipment is only shown for completeness and will not be modified by this project.

Environmental Benefits

Installation of the Rotary Sprue Cleaner and Return Conveyors (EU83) will have a number of environmental benefits. First, improving the cleanliness of the sprue will reduce the power consumption at the Electric Induction Furnaces (EU07-EU10). Second, removing the sand from the sprue and better separating the small metallics from the sand, will improve the quality of the spent sand, a valuable by-product, for possible internal and external reuse.

Emission Calculations

Emission calculations are provided in Appendix B. As installation of the Rotary Sprue Cleaner and Return Conveyors (EU83) does not debottleneck any existing operations nor does any existing operation experience an emission increase because of the operation, emission calculations are confined to the Rotary Sprue Cleaner (EU83). As excess exhaust air from the two above identified baghouses will be used to control emissions from the Rotary Sprue Cleaner (EU83), there would be no increase in emissions at the facility-level.

Appendix B-1 provides the controlled emissions from the Rotary Sprue Cleaner (EU83). Approximately 15,500 cfm from the Core/Mold Baghouse (CU08) and Fettling Baghouse (CU11) air volume will be used to control emissions from the Rotary Sprue Cleaner and Return Conveyors. Uncontrolled emission factors are provided but not used as there are no expected fugitive emissions from the installation.

Appendix B-2 provides the uncontrolled emissions from the Rotary Sprue Cleaner (EU83) as requested by Kentucky Division for Air Quality (KDAQ) Form DEP7007N. The basis of the emission calculation methodology is provided in Appendix B-2.

Appendix B-3 and B-4 provides the controlled emission rates for the Core/Mold Baghouse (CU08) and Fettling Baghouse (CU11) and all emission units that are exhausted to these baghouses.

Applicable Requirements
KDAQ regulations applicable to this project are identified in Form DEP7007V.

Application Package
The above identified forms along with all other required KDAQ Forms are provided in Appendix C. Please ensure the Responsible Official signs the Administrative Information Form (DEP7007AI) and the Insignificant Activities Form (From DEP7007DD). For completeness, please consider submitting this cover letter and package to KDAQ.

Should you have any questions regarding this request, please contact me at craig.schmeisser@madriverstrategies or 614.425.6392.

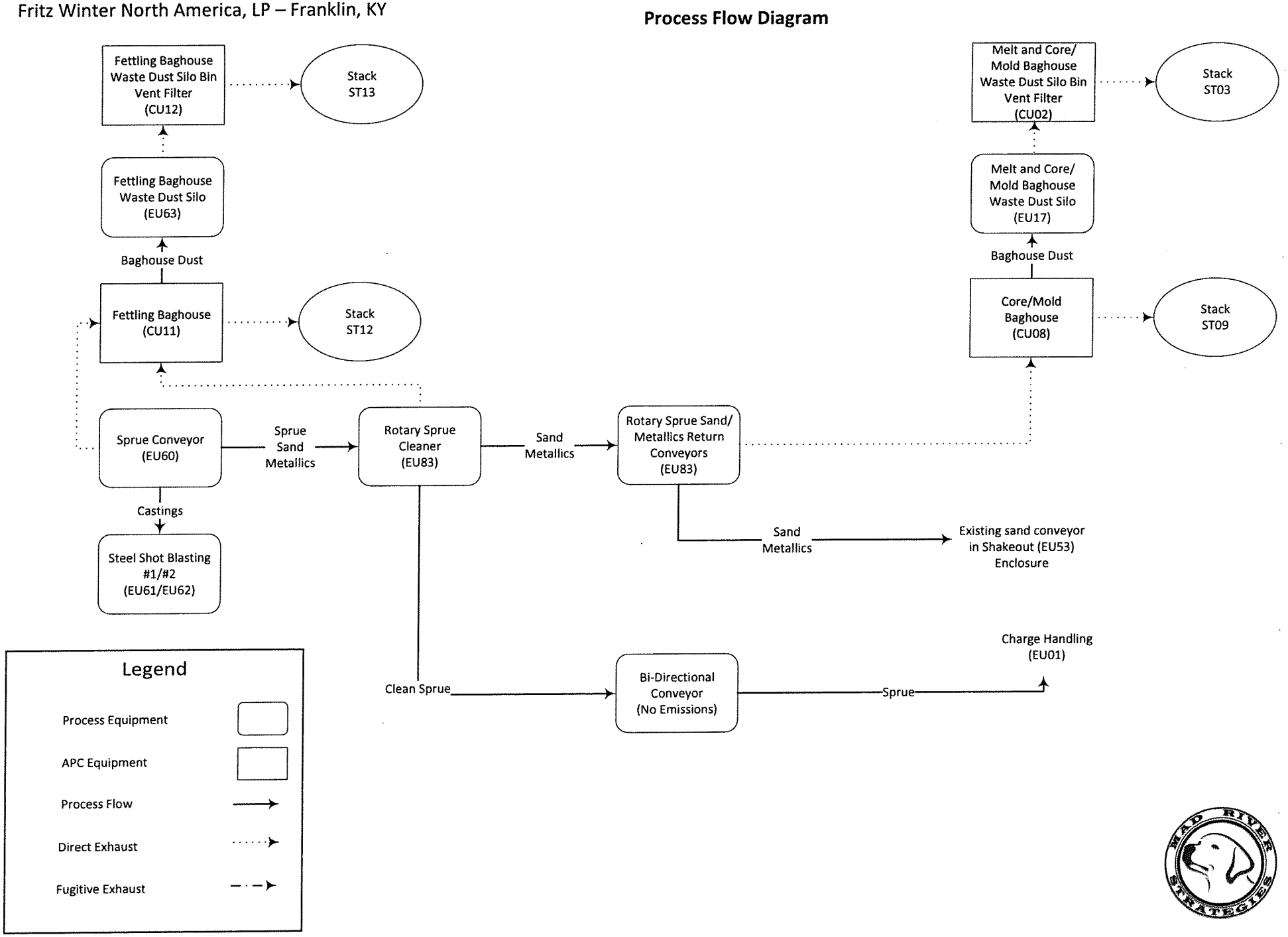
Respectfully submitted,

Craig S. Schmeisser
Senior Project Consultant

Copy to: Hauke May – FWNA
Joseph McCarty - FWNA

Appendix A
Process Flow Diagram

Fig 1.1 – Rotary Sprue Cleaner and Return Conveyors
Fritz Winter North America, LP – Franklin, KY



Appendix B
Emission Calculations

Controlled Emission Calculations
Rotary Sprue Cleaner and Return Conveyors Installation
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
87,600 Tons/Year

Flow Diagram Designation
Rotary Sprue Cleaner and Conveyors (Controlled)
EU83

Maximum Hourly Capacity
10.00 Tons/Hour Note 6

Process Description:
Fritz Winter North America, LP
Rotary Sprue Cleaner and Conveyors (Controlled)

Control Device:	CU08, CU11			
SCC Code:				
Control Device Outlet:	0.0020 gr/dscf	Note 7	0.0010 gr/dscf	Note 9
Airflow:	8,000 acfm	Note 2, 8	7,500 acfm	Note 3,8
Stack Gas Temperature:	90 °F		55 °F	

Facility Process Name:		Criteria Pollutants								
Rotary Sprue Cleaner and Conveyors (Controlled)										
Emission Factor Basis:		PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:	lb/ton	0.65	0.54	0.54						
(source)		Note 1	Note 4	Note 5						
Capture Efficiency		100.00	100.00	100.00						
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)		0.198	0.198	0.198						
Annual (TPY)		0.869	0.869	0.869						
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Total Emission Rate:										
Hourly (lb/hr)		0.198	0.198	0.198						
Annual (TPY)		0.869	0.869	0.869						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AIRS Facilities Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants (EPA Document No. 450/4-90-003, March 1990)
Note 2: Air volume exhausted from Rotary Sprue Return Conveyors to Core/Mold Baghouse (CU08).
Note 3: Air volume exhausted from Rotary Sprue Cleaner to Fettling Baghouse (CU11).
Note 4: WebFire SCC 30400350
Note 5: Assume $PM_{2.5}$ is equal to PM_{10} emission factor
Note 6: Potential throughput rate is 6.6 tph sprue/metallics, 10 tph sand. Emission factor based on sand.
Note 7: Outlet grain loading of CU06
Note 8: Total air volume and emissions of supporting baghouses CU08 and CU11 are attached.
Note 9: Outlet grain loading of CU11

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Uncontrolled Emission Calculations
Rotary Sprue Cleaner and Conveyors Installation
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
87,600 Tons/Year

Flow Diagram Designation
Rotary Sprue Cleaner and Conveyors (Uncontrolled)
EU83

Maximum Hourly Capacity
10.00 Tons/Hour Note 6

Process Description:
Fritz Winter North America, LP
Rotary Sprue Cleaner and Conveyors (Uncontrolled)
Control Device:
SCC Code:
Control Device Outlet: gr/dscf
Airflow: acfm Note 2, 3
Stack Gas Temperature: °F

Facility Process Name:		Criteria Pollutants								
Rotary Sprue Cleaner and Conveyors (Uncontrolled)										
Emission Factor Basis:		PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:	lb/ton	0.65	0.54	0.54						
(source)		Note 1	Note 4	Note 5						
Capture Efficiency										
Control Efficiency										
Building Capt. Eff										
Maximum Stack Emission Rate:										
Hourly (lb/hr)										
Annual (TPY)										
Maximum Fugitive Emission Rate:										
Hourly (lb/hr)		6.500	5.400	5.400						
Annual (TPY)		28.470	23.652	23.652						
Total Emission Rate:										
Hourly (lb/hr)		6.500	5.400	5.400						
Annual (TPY)		28.470	23.652	23.652						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: AIRS Facilities Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants (EPA Document No. 450/4-90-003, March 1990)
Note 2: Uncontrolled emissions are provided on worksheet
Note 3: Emissions will be vented to Core/Mold Baghouse (CU08) and Fettling Baghouse (CU11).
Note 4: WebFire SCC 30400350
Note 5: Assume $PM_{2.5}$ is equal to PM_{10} emission factor
Note 6: Potential throughput rate is 6.6 tph sprue/metallics, 10 tph sand. Emission factor based on sand.

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) (PM,PM-10) =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Core/Mold Baghouse Emission Calculations
Rotary Sprue Cleaner and Return Conveyors Installation
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Maximum Hourly Capacity
Tons/Hour

Flow Diagram Designation
Core/Mold Baghouse (CU08)
CU08

Process Description:
Fritz Winter North America, LP
Core/Mold Baghouse (CU08)

Control Device:	Core/Mold Baghouse (CU08)	
SCC Code:		
Control Device Outlet:	0.002 gr/dscf	Note 1
Airflow:	115,000 acfm	Note 2
Stack Gas Temperature:	90 °F	Note 2

Facility Process Name:	Criteria Pollutants								
Core/Mold Baghouse (CU08)									
Emission Factor Basis:	PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	1.900	1.900	1.900						
Annual (TPY)	8.321	8.321	8.321						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	1.900	1.900	1.900						
Annual (TPY)	8.321	8.321	8.321						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM10 and PM2.5 emission limit
Note 2: Consideration of conditions observed during 2018 and 2020 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Fettling Baghouse Emission Calculations
Rotary Sprue Cleaner and Return Conveyors Installation
Fritz Winter North America, LP
Franklin, Kentucky

Maximum Yearly Capacity
Tons/Year

Maximum Hourly Capacity
Tons/Hour

Flow Diagram Designation
Fettling Baghouse (CU11)
CU11

Process Description:
Fritz Winter North America, LP
Fettling Baghouse (CU11)

Control Device: Fettling Baghouse (CU11)
SCC Code:
Control Device Outlet: 0.001 gr/dscf Note 1
Airflow: 65,000 acfm Note 2
Stack Gas Temperature: 55 °F Note 2

Facility Process Name:	Criteria Pollutants								
Fettling Baghouse (CU11)									
Emission Factor Basis:	PM	PM10	PM2.5	SOx	NOx	VOC	CO	Lead	CO_2e
Emission Factors:									
(source)									
Capture Efficiency									
Control Efficiency									
Building Capt. Eff									
Maximum Stack Emission Rate:									
Hourly (lb/hr)	0.573	0.573	0.573						
Annual (TPY)	2.511	2.511	2.511						
Maximum Fugitive Emission Rate:									
Hourly (lb/hr)									
Annual (TPY)									
Total Emission Rate:									
Hourly (lb/hr)	0.573	0.573	0.573						
Annual (TPY)	2.511	2.511	2.511						

PROPOSED OPERATING SCHEDULE
24 HRS/DAY
8,760 HRS/YEAR

Note 1: Requested BACT PM, PM10 and PM2.5 emission limit
Note 2: Consideration of conditions observed during 2018 and 2020 performance tests

EXAMPLE CALCULATIONS:
Maximum Stack Emission Rate (lb/hr) {PM,PM-10} =(gr/acfm) x (acfm) x (1 lb / 7000 grains) x (60 min / 1 hr)
Maximum Annual (Ton/yr) stack Emission Rates = (lb/hr emission rate) x (hours of operation per year at max. rate) x (ton/2000 lbs)
Maximum Fugitive Emission Rate (lb/hr) = ((1 - Capture Efficiency/100) x (Emission Factor) x (Melt ton/hr) x (1-(Settling Factor)/100)
Maximum Annual Fugitive Emissions (ton/yr)= (Hourly fugitive emissions (lb/hr)/ hourly Process rate (ton/hr) x (Annual process rate (tons/yr) x (ton/2000 lbs)
Total Emission Rate (lb/hr) = (Maximum Stack Emission Rate lb/hr) + (Maximum Fugitive Emission Rate lb/hr)
Total Emission Rates Annual (TPY)= (annual stack emissions (ton/yr)) + (annual fugitive emissions (ton/yr))

Appendix C
Forms

1. DEP7007AI
2. DEP7007B
3. DEP7007N
4. DEP7007GG
5. DEP7007V
6. DEP7007DD

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information

___ Section AI.2: Applicant Information

___ Section AI.3: Owner Information

___ Section AI.4: Type of Application

___ Section AI.5: Other Required Information

___ Section AI.6: Signature Block

___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

___ Additional Documentation attached

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 11/30/2021

Section AI.1: Source Information

Physical Location Address:	**Street:**	1 Fritz Winter Drive				
	City:	Franklin	**County:**	Simpson	**Zip Code:**	42134
Mailing Address:	**Street or P.O. Box:**	1 Fritz Winter Drive				
	City:	Franklin	**State:**	KY	**Zip Code:**	42134

Standard Coordinates for Source Physical Location

Longitude: 36.79749 (decimal degrees) **Latitude:** -86.554991 (decimal degrees)

Primary (NAICS) Category: Motor Vehicle Brake System Mfg. **Primary NAICS #:** 336340

Classification (SIC) Category: Motor Vehicle Parts and Accessories **Primary SIC #:** 3714

Briefly discuss the type of business conducted at this site: The casting and machining of iron parts for the automotive industry.

Description of Area Surrounding Source: ☐ Rural Area ☑ Industrial Park ☐ Residential Area ☐ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employees: 300

Approximate distance to nearest residence or commercial property: *0.4 miles*

Property Area:

Is this source portable? ☐ Yes ☑ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☑ Currently Hold	☐ Need	☐ N/A
RCRA:	☑ Currently Hold	☐ Need	☐ N/A
UST:	☐ Currently Hold	☐ Need	☑ N/A

Type of Regulated Waste Activity: ☐ Mixed Waste Generator ☑ Generator ☐ Recycler ☐ Other: ☐ U.S. Importer of Hazardous Waste ☐ Transporter ☐ Treatment/Storage/Disposal Facility ☐ N/A

Section AI.2: Applicant Information

Applicant Name: Fritz Winter North America, LP

Title: (if individual)

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** KY **Zip Code:** 42134

Email: (if individual)

Phone: (270) 813-4000

Technical Contact

Name: Naomi Allen

Title: Project Engineer

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** Kentucky **Zip Code:** 42134

Email: naomi.allen@fritzwinter.us

Phone: (270) 813-4000

Air Permit Contact for Source

Name: Eddie Butler

Title: EHS Manager

Mailing Address: **Street or P.O. Box:** 1 Fritz Winter Drive
City: Franklin **State:** Kentucky **Zip Code:** 42134

Email: eddie.butler@fritzwinter.us

Phone: (270) 813-4000

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name:

Title:

Mailing Address: **Street or P.O. Box:**
City: **State:** **Zip Code:**

Email:

Phone:

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☐ Significant Revision	☐ Administrative Permit Amendment
☐ Renewal Permit	☐ Revised Registration	☑ Minor Revision	☐ Initial Source-wide OperatingPermit
☐ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☐ Revision	☐ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☑ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☑ Yes ☐ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☑ Particulate Matter	33.91	☑ Single HAP	9.9
☑ Volatile Organic Compounds (VOC)	112.45	☑ Combined HAPs	24.9
☑ Carbon Monoxide	312.39	☐ Air Toxics (40 CFR 68, Subpart F)	
☑ Nitrogen Oxides	39.9	☐ Carbon Dioxide	
☑ Sulfur Dioxide	39.9	☐ Greenhouse Gases (GHG)	
☑ Lead	0.59	☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* _____ **Proposed Operation Start-Up Date:** *(MM/YYYY)* _____

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)* 06/2022 **Proposed Operation Start-Up Date:** *(MM/YYYY)* 07/2022

Applicant is seeking coverage under a permit shield. ☐ Yes ☑ No **Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.**

Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

☐ DEP7007A Indirect Heat Exchangers and Turbines	☐ DEP7007CC Compliance Certification
☑ DEP7007B Manufacturing or Processing Operations	☑ DEP7007DD Insignificant Activities
☐ DEP7007C Incinerators and Waste Burners	☐ DEP7007EE Internal Combustion Engines
☐ DEP7007F Episode Standby Plan	☐ DEP7007FF Secondary Aluminum Processing
☐ DEP7007J Volatile Liquid Storage	☑ DEP7007GG Control Equipment
☐ DEP7007K Surface Coating or Printing Operations	☐ DEP7007HH Haul Roads
☐ DEP7007L Mineral Processes	☐ Confidentiality Claim
☐ DEP7007M Metal Cleaning Degreasers	☐ Ownership Change Form
☑ DEP7007N Source Emissions Profile	☐ Secretary of State Certificate
☐ DEP7007P Perchloroethylene Dry Cleaning Systems	☑ Flowcharts or diagrams depicting process
☐ DEP7007R Emission Offset Credit	☐ Digital Line Graphs (DLG) files of buldings, roads, etc.
☐ DEP7007S Service Stations	☐ Site Map
☐ DEP7007T Metal Plating and Surface Treatment Operations	☐ Map or drawing depicting location of facility
☑ DEP7007V Applicable Requirements and Compliance Activities	☐ Safety Data Sheet (SDS)
☐ DEP7007Y Good Engineering Practice and Stack Height Determination	☐ Emergency Response Plan
☐ DEP7007AA Compliance Schedule for Non-complying Emission Units	☑ Other: ___ Calcs
☐ DEP7007BB Certified Progress Report	

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.

[signature]	2.21.22
Authorized Signature	**Date**
Darryl Konsler	CEO
Type or Printed Name of Signatory	**Title of Signatory**

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations
Form identifies revised technical and environmental contact.
AI.4 - Permit shield is not available for minor permit revisions per 401 KAR Chapter 52 Section 14 (5)

Division for Air Quality

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DEP7007B

Manufacturing or Processing Operations

___ Section B.1: Process Information
___ Section B.2: Materials and Fuel Information
___ Section B.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.
___ Attach a flow diagram
___ Attach SDS

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 1/6/2021

Section B.1: Process Information

Emission Unit #	Emission Unit Name	Describe Emission Unit	Process ID	Process Name	Manufacturer	Model No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Is the Process Continuous or Batch?	Number of Batches per 24 Hours *(if applicable)*	Hours per Batch *(if applicable)*
EU83	Rotary Sprue Cleaner and Return Conveyors	Cleaning of sprue and return of metallics and sand for separation	EU83	Rotary Sprue Cleaner and Return Conveyors	N/K	N/K	06/2022	Continuous	N/A	N/A

Section B.2: Materials and Fuel Information

**Maximum yearly fuel usage rate only applies if applicant request operating restrictions through federally enforceable limitations.*

Emission Unit #	Emission Unit Name	Name of Raw Materials Input	Maximum Quantity of Each Raw Material Input	(Specify Units/hr)	Total Process Weight Rate for Emission Unit (tons/hr)	Name of Finished Materials	Maximum Quantity of Each Finished Material Output	(Specify Units/hr)	Fuel Type	Maximum Hourly Fuel Usage Rate	(Specify Units)	Maximum Yearly Fuel Usage Rate	(Specify Units)	Sulfur Content (%)	Ash Content (%)
EU83	Rotary Sprue Cleaner and Return Conveyors	Sprue Sand Metallics	6.6 10 NK	tons tons tons	16.6	Clean Sprue Sand Metallics	6.6 10 NK	tons tons tons	None	N/A	N/A	N/A	N/A	N/A	N/A

Section B.3: Notes, Comments, and Explanations

See Process Flow Diagram for additional information.

Division for Air Quality

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 1/15/2022

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
EU83	Rotary Sprue Cleaner and Return Conveyors	EU83	Rotary Sprue Cleaner and Return Conveyors	Core/Mold Baghouse Fettling Baghouse	CU08 CU11	ST09 ST12	6.6 tph (sprue) 10 tph (metla)	PM PM_{10} $PM_{2.5}$	0.65 lb/ton 0.54 lb/ton 0.54 lb/ton	AIRS EPA Doc # 450/4-90-003	100.00%	99+%	6.5 5.4 5.4	0.198 0.198 0.198	28.470 23.652 23.652	0.869 0.869 0.869

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
ST09	Control Device ID: CU08 Emission Unit ID(s): EU33, EU34, EU35A (sec), EU35B (sec), EU36, EU43 (sec), EU44, EU45, EU46, EU47, EU50, EU51, EU52, EU59, EU79 (sec), EU80 (sec), EU81 (sec), EU83	8.2	141.1	0	4072488	539816	176539	132	55.7
ST12	Control Device ID: CU11 Emission Unit ID(s): EU60 (sec), EU61, EU62, EU64, EU65, EU77 (sec), EU78 (sec), EU83	5.25	98.4	0	4072331	539832	64731	68	49.9

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
EU83	Rotary Sprue Cleaner and Return Conveyors	EU83	Only stack emissions are expected	Only stack emissions are expected	Only stack emissions are expected	Only stack emissions are expected	Only stack emissions are expected	Only stack emissions are expected

Section N.4: Notes, Comments, and Explanations
None

Division for Air Quality

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DEP7007GG

Control Equipment

Additional Documentation

___ Complete Sections GG.1 through GG.12, as applicable

___ Attach manufacturer's specifications for each control device

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 1/22/2021

Section GG.1: General Information - Control Equipment

Control Device ID #	Control Device Name	Cost	Manufacturer	Model Name/ Serial #	Date Installed	Inlet Gas Stream Data For All Control Devices					Inlet Gas Stream Data For Condensers, Adsorbers, Afterburners, Incinerators, Oxidizers Only			Equipment Operational Data For All Control Devices		
						Temperature (°F)	Flowrate (scfm @ 68 °F)	Average Particle Diameter (μm)	Particle Density (lb/ft^3) or Specific Gravity	Gas Density (lb/ft^3)	Gas Moisture Content (%)	Gas Composition	Fan Type	Pressure Drop Range (in. H_2O)	Pollutants Collected/ Controlled	Pollutant Removal (%)
CU08	Core/Mold Baghouse	--	Luehr Filter	3249.04/16	Oct-18	90.0	110400	N/K	N/K	N/K	N/A	N/A	N/A	0.5-12.0	Particulate Matter	99+
CU11	Fettling Baghouse	--	Luehr Filter	3249.03/16	Aug-16	55	66641	N/K	N/K	N/K	N/A	N/A	N/A	0.5-12	Particulate Matter	99+

Section GG.6: Filter

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Filter	Identify Type of Filter Unit: Baghouse, Cartridge Collector, or Other (specify)	Identify Type of Filtering Material: Fabric, Paper, Synthetic, or Other (specify)	Total Filter Area (ft^2)	Effective Air-to-Filter Ratio ($acfm/ft^2$)	Continuous Monitoring Instrumentation (e.g. COMS, BLDS, none)	Additional Materials Introduced into the Control System (e.g. lime, carbon)		Identify Cleaning Method: Shaker, Pulse Air, Reverse Air, Pulse Jet, or Other (specify)	Identify Gas Cooling Method: Ductwork, Heat Exchanger, Bleed-in Air, Water Spray, or Other (specify)	For Ductwork:		For Bleed-in Air:	For Water Spray:
							Material	Injection Rate (lb/hr)			Length (ft)	Diameter (ft)	Flowrate ($scfm$ @ 68 °F)	Flowrate (gal/min)
CU08	EU33, EU34, EU35A (sec), EU35B (sec), EU36, EU43 (sec), EU44, EU45, EU46, EU47, EU50, EU51, EU52, EU59, EU79 (sec), EU80 (sec), EU81 (sec), EU83	Baghouse	Fabric	NK	NK	BLDS Magnahelic	NA	NA	Pulse Jet	Ductwork	NK	NK	NA	NA
CU11	EU60 (sec), EU61, EU62, EU64, EU65, EU77 (sec), EU78 (sec), EU83	Baghouse	Fabric	NK	NK	BLDS Magnahelic	NA	NA	Pulse Jet	Ductwork	NK	NK	NA	NA

Section GG.12: Notes, Comments, and Explanations
None

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DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirements
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation
___ Complete DEP7007AI

Source Name: Fritz Winter
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 1/30/2021

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
EU83	Rotary Sprue Cleaner and Return Conveyors	401 KAR 59:010 Section 3(2)	PM	20.49 lb/hr	0.001 ($PM_{10}/PM_{2.5}$)	Process exhausted to Core/Mold and Fettling Baghouses	APCD operating - process vented to baghouse
EU83	Rotary Sprue Cleaner and Return Conveyors	401 KAR 59:010 Section 3(1)(a)	Opacity	20% opacity	N/A	Process exhausted to Core/Mold and Fettling Baghouses	APCD operating - process vented to baghouse

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
EU83	Rotary Sprue Cleaner and Return Conveyors	PM	401 KAR 59:010 Section 3(2)	Pressure Drop	Pressure drop will insure the air pollution control device is operational.
EU83	Rotary Sprue Cleaner and Return Conveyors	Opacity	401 KAR 59:010 Section 3(1)(a)	Pressure Drop	Pressure drop will insure the air pollution control device is operational and opacity limitation met.

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
EU83	Rotary Sprue Cleaner and Return Conveyors	PM	401 KAR 59:010 Section 3(2)	Pressure Drop	Pressure drop will insure the air pollution control device is operational.
EU83	Rotary Sprue Cleaner and Return Conveyors	Opacity	401 KAR 59:010 Section 3(1)(a)	Pressure Drop	Pressure drop will insure the air pollution control device is operational and opacity limitation met.

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
EU83	Rotary Sprue Cleaner and Return Conveyors	PM	401 KAR 59:010 Section 3(2)	Pressure Drop	See Section F of Permit Number V-16-022 R1
EU83	Rotary Sprue Cleaner and Return Conveyors	Opacity	401 KAR 59:010 Section 3(1)(a)	Pressure Drop	See Section F of Permit Number V-16-022 R1

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
EU83	Rotary Sprue Cleaner and Return Conveyors	PM	401 KAR 59:010 Section 3(2)	PM	Method 5, if requested
EU83	Rotary Sprue Cleaner and Return Conveyors	Opacity	401 KAR 59:010 Section 3(1)(a)	Opacity	Method 9, if requested

Section V.6: Notes, Comments, and Explanations
Emissions from the Rotary Sprue Cleaner are routed to the existing Fettling Baghouse (CU11). The sand and metallic tranfer conveyor emissions are routed to existing Core/Mold Baghouse (CU08). No additional air volume requirements from the existing baghouses is necessary above the air volume previously tested.

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DEP7007DD

Insignificant Activities

___ Section DD.1: Table of Insignificant Activities
___ Section DD.2: Signature Block
___ Section DD.3: Notes, Comments, and Explanations

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 1/15/2022

Section DD.1: Table of Insignificant Activities

*Identify each activity with a unique Insignificant Activity number (IA #); for example: 1, 2, 3... etc.

Insignificant Activity #	Description of Activity including Rated Capacity	Serial Number or Other Unique Identifier	Applicable Regulation(s)	Calculated Emissions
None	N/A	N/A	N/A	N/A

Section DD.2: Signature Block

I, THE UNDERSIGNED, HEREBY CERTIFY UNDER PENALTY OF LAW, THAT I AM A RESPONSIBLE OFFICIAL, AND THAT I HAVE PERSONALLY EXAMINED, AND AM FAMILIAR WITH, THE INFORMATION SUBMITTED IN THIS DOCUMENT AND ALL ITS ATTACHMENTS. BASED ON MY INQUIRY OF THOSE INDIVIDUALS WITH PRIMARY RESPONSIBILITY FOR OBTAINING THE INFORMATION, I CERTIFY THAT THE INFORMATION IS ON KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE OR INCOMPLETE INFORMATION, INCLUDING THE POSSIBILITY OF FINE OR IMPRISONMENT.

By:	Authorized Signature	Date
	Darryl Konsler	CEO
	Type/Print Name of Siguatory	Title of Siguatory

Section DD.3: Notes, Comments, and Explanations

No additional insignificant emission units will be installed as part of this project.

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emission Group 10 – Rotary Sprue Cleaner and Return Conveyors
Description: Cleaning of sprue and return of metallics and sand for separation.

Emission Unit 83 (EU83) Rotary Sprue Cleaner and Return Conveyors
Manufacturer/Model: Didion Model RS-200 SM Mark 5
Estimated Start of Construction: June 2022
Maximum Capacity: 10.0 tons sand per hour; 6.6 tons sprue/metallics per hour
Controls: Baghouse

APPLICABLE REGULATIONS:
401 KAR 51:010, New Process Operations
401 KAR 63:010, Potentially hazardous matter or toxic substances

1. Operating Limitations:

a. The Rotary Sprue Cleaner and Return Conveyors (EU83) shall not operate unless the associated baghouse(s) is operating so the emission and opacity limits set forth below are not exceeded. [401KAR 63:010]

2. Emission Limitations:

For emissions from a control device or stack no person shall cause, suffer, allow or permit the emission into the open air of particulate matter from any affected facility which is in excess of the following: [401 KAR 59:010, Section 3(2)]

i. For process weight rates of 0.50 tons/hr or less: 2.34 lb/hr
ii. For process weight rates up to 30 tons/hr: $E=3.59P^{0.62}$
iii. For process weight rates greater than 30 tons/hr: $E=17.31P^{0.16}$

Where E=the allowable particulate emissions rate in pounds/hour)
P=the process rate in tons per hour

b. No person shall cause, suffer, allow, or permit any continuous emissions into the open air from a control device or stack associated with any affected facility which is equal to or greater than twenty (20) percent opacity. [401 KAR 63:010, Section 3(1)]

c. Hourly and annual emissions shall not exceed the following:

Emission Unit	PM/PM10/PM2.5 (lb/hr);(ton/yr)	VOC (lb/hr);(ton/yr)
EU83	0.20lb/hr; 0.87 tpy	N/A

SECTION B - EMISSION UNITS, EMISSION POINTS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

3. Testing Requirements:

Testing shall be conducted at such times as may be required by the Cabinet in accordance with 401 KAR 50:045.

4. Specific Monitoring Requirements:

a. The permittee shall perform a qualitative visual observation of the opacity of emissions at each stack daily and maintain a log of the observations. If visible emissions from a stack are seen (not including condensed water in the plume), then an inspection of process/control equipment shall be initiated and corrective action taken. If visible emissions are present after the corrective action, the process(s) shall be shut down and shall not operate again until repairs have been made that result in no visible emissions from the process(s) during operation. In lieu of shutting the process(s) down, the permittee may determine the opacity using Reference Method 9. If the opacity limit is not exceeded, the process(s) may continue to operate. [401 KAR 51:017]

b. Identify any time the emission unit is in operation without the corresponding baghouse being in operation.

c. For each emission unit listed above, the permittee shall monitor the following parameters:
   i. Monthly and 12-month rolling total hours of operation;
   ii. Monthly and 12-month rolling total emissions of PM, PM10 and PM2.5.

.

5. Specific Recordkeeping Requirements:

a. Daily qualitative visual observation of the opacity of emissions at each stack, records of inspections and necessary corrective actions and/or required Method 9 observations.

b. Records of the monthly and twelve-month rolling total emissions of PM, PM10 and PM2.5 shall be maintained.

6. Specific Reporting Requirements:

Refer to SECTION F.

7. Specific Control Equipment Operating Conditions:

a. A monitoring device (differential pressure gauges or manometers) shall be installed to determine the pressure drop across the baghouse at a minimum of once per day. A permanent label displaying the operating range established shall be posted next to the selected instrument.

b. The permittee shall maintain documentation detailing the operation and maintenance of the baghouses

Basis	Value	Unit	Reference
Maximum generator hourly usage	500	hr/yr	Calculating Potential to Emit (PTE) for new Cummins RS20AC 20KW Quiet Connect Generator. Max Hours From EPA Memorandum- September 6, 1995
RS20AC Natural Gas Consumption	0.255947	MMBtu/hr	Per Cummins RS20AC Spec Sheet
Natural Gas FPM emission factor	0.00991	lb/MMBtu	AP-42, Table 3.2-2, Uncontrolled Emission Factors For 4-Stroke Lean-Burn Engines (SCC 2-02-002-54)
Natural Gas FPM (2.5 ,10) emission factor	0.0000771	lb/MMBtu	AP-42, Table 3.2-2, Uncontrolled Emission Factors For 4-Stroke Lean-Burn Engines (SCC 2-02-002-54). Consider less than or equal to one micrometer in aerodynamic diameter. Therefore, for filterable PM emissions, PM10=PM2.5
Natural Gas generator CO emission factor	0.317	lb/MMBtu	AP-42, Table 3.2-2, Uncontrolled Emission Factors For 4-Stroke Lean-Burn Engines (SCC 2-02-002-54)
Natural Gas generator NOx emission factor	4.08	lb/MMBtu	AP-42, Table 3.2-2, Uncontrolled Emission Factors For 4-Stroke Lean-Burn Engines (SCC 2-02-002-54)
Natural Gas generator VOC emission factor	0.118	lb/MMBtu	AP-42, Table 3.2-2, Uncontrolled Emission Factors For 4-Stroke Lean-Burn Engines (SCC 2-02-002-54)

		Units			Units			Units			Units
FPM (Uncontrolled)											
	0.255947	MMBtu/hr	*	500	hr/yr	*	0.00991	lb/MMBtu	/	2000 pounds/ton	= 0.000634109 tons/year
FPM (2.5,10 - Uncontrolled)											
	0.255947	MMBtu/hr	*	500	hr/yr	*	0.0000771	lb/MMBtu	/	2000 pounds/ton	= 4.933378E-06 tons/year
CO (Uncontrolled)											
	0.255947	MMBtu/hr	*	500	hr/yr	*	0.317	lb/MMBtu	/	2000 pounds/ton	= 0.0202838 tons/year
NOx (Uncontrolled)											
	0.255947	MMBtu/hr	*	500	hr/yr	*	4.08	lb/MMBtu	/	2000 pounds/ton	= 0.26106594 tons/year
VOC (Uncontrolled)											
	0.255947	MMBtu/hr	*	500	hr/yr	*	0.118	lb/MMBtu	/	2000 pounds/ton	= 0.007550437 tons/year

Conversion Factor - 2000 Pounds = 1 ton

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information

___ Section AI.2: Applicant Information

___ Section AI.3: Owner Information

___ Section AI.4: Type of Application

___ Section AI.5: Other Required Information

___ Section AI.6: Signature Block

___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

___ Additional Documentation attached

Source Name:

KY EIS (AFS) #: 21- 213-00064

Permit #: V-16-022 R1

Agency Interest (AI) ID: 129745

Date: 9/23/2024

Section AI.1: Source Information

Physical Location Address:	**Street:**	1 Fritz Winter Drive				
	City:	Franklin	**County:**	Simpson	**Zip Code:**	42134
Mailing Address:	**Street or P.O. Box:**	1 Fritz Winter Drive				
	City:	Franklin	**State:**	Kentucky	**Zip Code:**	42134

Standard Coordinates for Source Physical Location

Longitude: -86.55588 (decimal degrees) **Latitude:** 36.79805 (decimal degrees)

Primary (NAICS) Category: Motor Vehicle Brake System Manufacturing **Primary NAICS #:** 336340

Classification (SIC) Category: Motor Vehicle Parts and Accessories **Primary SIC #:** 3714

Briefly discuss the type of business conducted at this site: Fritz-Winter Manufactures Brake Rotors In the Automotive Industry.

Description of Area Surrounding Source: ☑ Rural Area ☑ Industrial Park ☐ Residential Area ☐ Urban Area ☑ Industrial Area ☑ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employees: 270

Approximate distance to nearest residence or commercial property: 230 yards

Property Area: 96 acres

Is this source portable? ☐ Yes ☑ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☐ Currently Hold	☐ Need	☐ N/A
RCRA:	☑ Currently Hold	☐ Need	☐ N/A
UST:	☐ Currently Hold	☐ Need	☑ N/A

Type of Regulated Waste Activity:

☐ Mixed Waste Generator ☑ Generator ☐ Recycler ☐ Other: _____

☐ U.S. Importer of Hazardous Waste ☐ Transporter ☐ Treatment/Storage/Disposal Facility ☐ N/A

Section AI.2: Applicant Information

Applicant Name: Fritz Winter North America, LP

Title: (if individual)

Mailing Address:
Street or P.O. Box: 1 Fritz Winter Drive
City: Franklin **State:** Kentucky **Zip Code:** 42134

Email: (if individual)

Phone: (270) 813-4000

Technical Contact

Name: Jordan Smith

Title: EHS Engineer

Mailing Address:
Street or P.O. Box: 1 Fritz Winter Drive
City: Franklin **State:** Kentucky **Zip Code:** 42134

Email: Jordan.Smith@fritzwinter.us

Phone: 812-585-9106

Air Permit Contact for Source

Name: Jordan Smith

Title: EHS Engineer

Mailing Address:
Street or P.O. Box: 1 Fritz Winter Drive
City: Franklin **State:** Kentucky **Zip Code:** 42134

Email: Jordan.Smith@fritzwinter.us

Phone: 812-585-9106

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name:

Title:

Mailing Address: **Street or P.O. Box:**

City: **State:** **Zip Code:**

Email:

Phone:

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position
Fritz Winter North America, LP	Owner

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☐ Significant Revision	☐ Administrative Permit Amendment
☐ Renewal Permit	☐ Revised Registration	☐ Minor Revision	☐ Initial Source-wide OperatingPermit
☑ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☐ Revision	☐ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☐ Yes ☑ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☐ Particulate Matter		☐ Single HAP	
☐ Volatile Organic Compounds (VOC)		☐ Combined HAPs	
☐ Carbon Monoxide		☐ Air Toxics (40 CFR 68, Subpart F)	
☐ Nitrogen Oxides		☐ Carbon Dioxide	
☐ Sulfur Dioxide		☐ Greenhouse Gases (GHG)	
☐ Lead		☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* _____ **Proposed Operation Start-Up Date:** *(MM/YYYY)* _____

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)* _____ **Proposed Operation Start-Up Date:** *(MM/YYYY)* _____

Applicant is seeking coverage under a permit shield. ☑ **Yes** ☐ **No** **Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.**

Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

- [ ] DEP7007A Indirect Heat Exchangers and Turbines
- [ ] DEP7007B Manufacturing or Processing Operations
- [ ] DEP7007C Incinerators and Waste Burners
- [ ] DEP7007F Episode Standby Plan
- [ ] DEP7007J Volatile Liquid Storage
- [ ] DEP7007K Surface Coating or Printing Operations
- [ ] DEP7007L Mineral Processes
- [ ] DEP7007M Metal Cleaning Degreasers
- [x] DEP7007N Source Emissions Profile
- [ ] DEP7007P Perchloroethylene Dry Cleaning Systems
- [ ] DEP7007R Emission Offset Credit
- [ ] DEP7007S Service Stations
- [ ] DEP7007T Metal Plating and Surface Treatment Operations
- [x] DEP7007V Applicable Requirements and Compliance Activities
- [ ] DEP7007Y Good Engineering Practice and Stack Height Determination
- [ ] DEP7007AA Compliance Schedule for Non-complying Emission Units
- [ ] DEP7007BB Certified Progress Report
- [ ] DEP7007CC Compliance Certification
- [ ] DEP7007DD Insignificant Activities
- [x] DEP7007EE Internal Combustion Engines
- [ ] DEP7007FF Secondary Aluminum Processing
- [ ] DEP7007GG Control Equipment
- [ ] DEP7007HH Haul Roads
- [ ] Confidentiality Claim
- [ ] Ownership Change Form
- [ ] Secretary of State Certificate
- [ ] Flowcharts or diagrams depicting process
- [ ] Digital Line Graphs (DLG) files of buldings, roads, etc.
- [ ] Site Map
- [ ] Map or drawing depicting location of facility
- [ ] Safety Data Sheet (SDS)
- [ ] Emergency Response Plan
- [ ] Other: _____

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.

[signature]	09/27/24
Authorized Signature	**Date**
Henning Knipper	President
Type or Printed Name of Signatory	**Title of Signatory**

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations
No Comments

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007EE

Internal Combustion Engines

___ Section EE.1: General Information
___ Section EE.2: Operating Information
___ Section EE.3: Design Information
___ Section EE.4: Fuel Information
___ Section EE.5: Emission Factor Information
___ Section EE.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG

___ Attach EPA certification of the engine

Source Name: **Fritz Winter North America, LP**
KY EIS (AFS) #: **21- 213-00064**
Permit #: **V-16-022 R1**
Agency Interest (AI) ID: **129745**
Date: **9/23/2024**

Section EE.1: General Information

Emission Unit #	Emission Unit Name	Control Device ID	Stack ID	Manufacturer	Model Number	Model Year	Date of Manufacture	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Date Reconstructed/ Modified	List Applicable Regulations
EU77	RS20AC Natural Gas Generator	Uncontrolled	N/A	Cummins	C20N6HC	2024	2024	11/2024	N/A	401 KAR 52:020

Section EE.2: Operating Information

Emission Unit #	Engine Purpose (Identify if Non-Emergency, Emergency,Fire/Water Pump, Black-start engine for combustion turbine, Engine Testing)	Hours Operated	Is this engine a rental? *(Yes/No)*	Rental Time Period *(hrs)*	Alternate Operating Scenarios (Describe any operating scenarios in which the engine may be used in a different configuration)
EU77	Emergency	500	No	N/A	N/A

Section EE.3: Design Information

Emission Unit #	Engine Type (Identify all that apply: Commercial, Institutional, Stationary, Non-Road)	Ignition Type (Identify if either Compression or Spark Ignition)	Engine Family (Identify all that apply: 2-stroke, 4-stroke, Rich Burn, Lean Burn)	Maximum Engine Power *(bhp)*	Maximum Engine Speed *(rpm)*	Total Displacement *(L)*	Number of Cylinders
EU77	Stationary/Non-Road	Spark Ignition	4-Stroke Lean Burn	26.82 (calculated from 20 kW)	3600 (from spec sheet)	1.0 (from spec sheet)	2

Section EE.4: Fuel Information

Emission Unit #	Identify if Primary, Secondary, or Tertiary Fuel	Fuel Type (Identify if Diesel, Gasoline, Natural Gas, Liquefied Petroleum Gas (LPG), Landfill/Digester Gas, or Other)	Fuel Grade	Percent Time Used *(%)*	Maximum Fuel Consumption	Heat Content	Sulfur Content *(%)*	SCC Code	SCC Units
EU77	Primary	Natural Gas	N/A	100	0.255947 MMBtu/hr (from spec sheet)	1000 Btu/cf	0	2102006000	MMBtu/hr

Section EE.5: Emission Factor Information

Emission factors expressed here are based on the potential to emit.

Emission Unit #	Fuel	Pollutant	Emission Factor	Emission Factor Units	Source of Emission Factor
EU77	Natural Gas	FPM	0.00991	lb/MMBtu	AP-42, Table 3.2-2, Uncontrolled Emission Factors For 4-Stroke Lean-Burn Engines (SCC 2-02-002-54)
EU77	Natural Gas	FPM 2.5, 10	0.0000771	lb/MMBtu	AP-42, Table 3.2-2, Uncontrolled Emission Factors For 4-Stroke Lean-Burn Engines (SCC 2-02-002-54). Consider less than or equal to one micrometer in aerodynamic diameter. Therefore, for filterable PM emissions, PM10=PM2.5
EU77	Natural Gas	CO	0.317	lb/MMBtu	AP-42, Table 3.2-2, Uncontrolled Emission Factors For 4-Stroke Lean-Burn Engines (SCC 2-02-002-54)
EU77	Natural Gas	NOx	4.08	lb/MMBtu	AP-42, Table 3.2-2, Uncontrolled Emission Factors For 4-Stroke Lean-Burn Engines (SCC 2-02-002-54)
EU77	Natural Gas	VOCs	0.118	lb/MMBtu	AP-42, Table 3.2-2, Uncontrolled Emission Factors For 4-Stroke Lean-Burn Engines (SCC 2-02-002-54)

Emission Unit #	Fuel	Pollutant	Emission Factor	Emission Factor Units	Source of Emission Factor

Section EE.6: Notes, Comments, and Explanations

N/A

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Fritz Winter North America, LP
KY EIS (AFS) #: 21- 213-00064
Permit #: V-16-022 R1
Agency Interest (AI) ID: 129745
Date: 9/23/2024

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU77	RS20AC Natural Gas Generator	Server Room Generator	PTE	N/A	N/A	N/A	0.255947 MMBtu/hr	PM	0.00991 lb/MMBtu	AP-42	N/A	N/A	0.0025	N/A	0.000634109	N/A
EU77	RS20AC Natural Gas Generator	Server Room Generator	PTE	N/A	N/A	N/A	0.255947 MMBtu/hr	PM 2.5, 10	0.0000771 lb/MMBtu	AP-42	N/A	N/A	0.0000197	N/A	4.93338E-06	N/A
EU77	RS20AC Natural Gas Generator	Server Room Generator	PTE	N/A	N/A	N/A	0.255947 MMBtu/hr	CO	0.317 lb/MMBtu	AP-42	N/A	N/A	0.081	N/A	0.0202838	N/A
EU77	RS20AC Natural Gas Generator	Server Room Generator	PTE	N/A	N/A	N/A	0.255947 MMBtu/hr	Nox	4.08 lb/MMBtu	AP-42	N/A	N/A	1.044	N/A	0.26106594	N/A
EU77	RS20AC Natural Gas Generator	Server Room Generator	PTE	N/A	N/A	N/A	0.255947 MMBtu/hr	VOC	0.118 lb/MMBtu	AP-42	N/A	N/A	0.030	N/A	0.007550437	N/A

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Section N.4: Notes, Comments, and Explanations
No Notes

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)

___ Section V.2: Monitoring Requirements

___ Section V.3: Recordkeeping Requirements

___ Section V.4: Reporting Requirements

___ Section V.5: Testing Requirements

___ Section V.6: Notes, Comments, and Explanations

Additional Documentation
___ Complete DEP7007AI

Source Name: **Fritz Winter North America, LP**

KY EIS (AFS) #: **21-213-00064**

Permit #: **V-16-022 R1**

Agency Interest (AI) ID: **129745**

Date: **9/23/2024**

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
EU77	RS20AC Natural Gas Generator	401 KAR 51:017, 401 KAR 60:005, Section 2(2)(dddd), 40 CFR 60, Subpart IIII, 401 KAR 63:002, Section 2(4)(eeee), 40 CFR 63, Subpart ZZZZ	PM	N/A	N/A	N/A	Excel spreadsheet calculations

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
EU77	RS20AC Natural Gas Generator	402 KAR 51:017, 401 KAR 60:005, Section 2(2)(dddd), 40 CFR 60, Subpart IIII, 401 KAR 63:002, Section 2(4)(eeee), 40 CFR 63, Subpart ZZZZ	PM 2.5, 10	N/A	N/A	N/A	Excel spreadsheet calculations
EU77	RS20AC Natural Gas Generator	403 KAR 51:017, 401 KAR 60:005, Section 2(2)(dddd), 40 CFR 60, Subpart IIII, 401 KAR 63:002, Section 2(4)(eeee), 40 CFR 63, Subpart ZZZZ	CO	N/A	N/A	N/A	Excel spreadsheet calculations
EU77	RS20AC Natural Gas Generator	404 KAR 51:017, 401 KAR 60:005, Section 2(2)(dddd), 40 CFR 60, Subpart IIII, 401 KAR 63:002, Section 2(4)(eeee), 40 CFR 63, Subpart ZZZZ	NOx	N/A	N/A	N/A	Excel spreadsheet calculations
EU77	RS20AC Natural Gas Generator	405 KAR 51:017, 401 KAR 60:005, Section 2(2)(dddd), 40 CFR 60, Subpart IIII, 401 KAR 63:002, Section 2(4)(eeee), 40 CFR 63, Subpart ZZZZ	VOC	N/A	N/A	N/A	Excel spreadsheet calculations

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
EU77	RS20AC Natural Gas Generator	PM	[40 CFR 60.4214(b)]	Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput	Record the following information : Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput
EU77	RS20AC Natural Gas Generator	PM 2.5, 10	[40 CFR 60.4214(b)]	Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput	Record the following information : Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput
EU77	RS20AC Natural Gas Generator	CO	[40 CFR 60.4214(b)]	Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput	Record the following information : Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput
EU77	RS20AC Natural Gas Generator	NOx	[40 CFR 60.4214(b)]	Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput	Record the following information : Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput
EU77	RS20AC Natural Gas Generator	VOC	[40 CFR 60.4214(b)]	Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput	Record the following information : Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
EU77	RS20AC Natural Gas Generator	PM	[40 CFR 60.4214(b)]	Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput	Record the following information : Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput
EU77	RS20AC Natural Gas Generator	PM 2.5, 10	[40 CFR 60.4214(b)]	Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput	Record the following information : Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput
EU77	RS20AC Natural Gas Generator	CO	[40 CFR 60.4214(b)]	Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput	Record the following information : Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput
EU77	RS20AC Natural Gas Generator	NOx	[40 CFR 60.4214(b)]	Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput	Record the following information : Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput
EU77	RS20AC Natural Gas Generator	VOC	[40 CFR 60.4214(b)]	Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput	Record the following information : Monthly and 12-month rolling total hours of operation and Monthly and 12-month rolling total natural has throughput

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
EU77	RS20AC Natural Gas Generator	PM	40 CFR 60.4211(f)(2)(ii) and (iii), 40 CFR 60.4211(f)(3)(i), [40 CFR 60.4214(d)]	Report emissions in annual report	If an emergency stationary CI ICE operates or is contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in 40 CFR 60.4211(f)(2)(ii) and (iii) or operates for the purposes specified in 40 CFR 60.4211(f)(3)(i), the permittee shall submit an annual report according to the requirements in 40 CFR 60.4214(d)(1) through (3). [40 CFR 60.4214(d)]
EU77	RS20AC Natural Gas Generator	PM 2.5, 10	41 CFR 60.4211(f)(2)(ii) and (iii), 40 CFR 60.4211(f)(3)(i), [40 CFR 60.4214(d)]	Report emissions in annual report	If an emergency stationary CI ICE operates or is contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in 40 CFR 60.4211(f)(2)(ii) and (iii) or operates for the purposes specified in 40 CFR 60.4211(f)(3)(i), the permittee shall submit an annual report according to the requirements in 40 CFR 60.4214(d)(1) through (3). [40 CFR 60.4214(d)]
EU77	RS20AC Natural Gas Generator	CO	42 CFR 60.4211(f)(2)(ii) and (iii), 40 CFR 60.4211(f)(3)(i), [40 CFR 60.4214(d)]	Report emissions in annual report	If an emergency stationary CI ICE operates or is contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in 40 CFR 60.4211(f)(2)(ii) and (iii) or operates for the purposes specified in 40 CFR 60.4211(f)(3)(i), the permittee shall submit an annual report according to the requirements in 40 CFR 60.4214(d)(1) through (3). [40 CFR 60.4214(d)]
EU77	RS20AC Natural Gas Generator	NOx	43 CFR 60.4211(f)(2)(ii) and (iii), 40 CFR 60.4211(f)(3)(i), [40 CFR 60.4214(d)]	Report emissions in annual report	If an emergency stationary CI ICE operates or is contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in 40 CFR 60.4211(f)(2)(ii) and (iii) or operates for the purposes specified in 40 CFR 60.4211(f)(3)(i), the permittee shall submit an annual report according to the requirements in 40 CFR 60.4214(d)(1) through (3). [40 CFR 60.4214(d)]
EU77	RS20AC Natural Gas Generator	VOC	44 CFR 60.4211(f)(2)(ii) and (iii), 40 CFR 60.4211(f)(3)(i), [40 CFR 60.4214(d)]	Report emissions in annual report	If an emergency stationary CI ICE operates or is contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in 40 CFR 60.4211(f)(2)(ii) and (iii) or operates for the purposes specified in 40 CFR 60.4211(f)(3)(i), the permittee shall submit an annual report according to the requirements in 40 CFR 60.4214(d)(1) through (3). [40 CFR 60.4214(d)]

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
EU77	RS20AC Natural Gas Generator	PM	40 CFR 60, Subpart IIII, 40 CFR 60.4212(a) through €, 40 CFR part 1042, subpart F, 401 KAR 59:005, Section 2(2) and 401 KAR 50:045	Emissions	Exhaust emissions from stationary CI ICE that are complying with the emission standards for new CI engines in 40 CFR part 1042 shall not exceed the NTE standards for the same model year and maximum engine power as required in 40 CFR 1042.101(c). [40 CFR 60.4212(e)]. b. Pursuant to 401 KAR 59:005, Section 2(2) and 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.
EU77	RS20AC Natural Gas Generator	PM 2.5, 10	41 CFR 60, Subpart IIII, 40 CFR 60.4212(a) through €, 40 CFR part 1042, subpart F, 401 KAR 59:005, Section 2(2) and 401 KAR 50:045	Emissions	Exhaust emissions from stationary CI ICE that are complying with the emission standards for new CI engines in 40 CFR part 1042 shall not exceed the NTE standards for the same model year and maximum engine power as required in 40 CFR 1042.101(c). [40 CFR 60.4212(e)]. b. Pursuant to 401 KAR 59:005, Section 2(2) and 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.
EU77	RS20AC Natural Gas Generator	CO	42 CFR 60, Subpart IIII, 40 CFR 60.4212(a) through €, 40 CFR part 1042, subpart F, 401 KAR 59:005, Section 2(2) and 401 KAR 50:045	Emissions	Exhaust emissions from stationary CI ICE that are complying with the emission standards for new CI engines in 40 CFR part 1042 shall not exceed the NTE standards for the same model year and maximum engine power as required in 40 CFR 1042.101(c). [40 CFR 60.4212(e)]. b. Pursuant to 401 KAR 59:005, Section 2(2) and 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.
EU77	RS20AC Natural Gas Generator	NOx	43 CFR 60, Subpart IIII, 40 CFR 60.4212(a) through €, 40 CFR part 1042, subpart F, 401 KAR 59:005, Section 2(2) and 401 KAR 50:045	Emissions	Exhaust emissions from stationary CI ICE that are complying with the emission standards for new CI engines in 40 CFR part 1042 shall not exceed the NTE standards for the same model year and maximum engine power as required in 40 CFR 1042.101(c). [40 CFR 60.4212(e)]. b. Pursuant to 401 KAR 59:005, Section 2(2) and 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.
EU77	RS20AC Natural Gas Generator	VOC	44 CFR 60, Subpart IIII, 40 CFR 60.4212(a) through €, 40 CFR part 1042, subpart F, 401 KAR 59:005, Section 2(2) and 401 KAR 50:045	Emissions	Exhaust emissions from stationary CI ICE that are complying with the emission standards for new CI engines in 40 CFR part 1042 shall not exceed the NTE standards for the same model year and maximum engine power as required in 40 CFR 1042.101(c). [40 CFR 60.4212(e)]. b. Pursuant to 401 KAR 59:005, Section 2(2) and 401 KAR 50:045, Section 1, performance testing using the Reference Methods specified in 401 KAR 50:015 shall be conducted as required by the Division.

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing

Section V.6: Notes, Comments, and Explanations
No Comments

Fritz Winter
North America LP

Fritz Winter North America LP 1 Fritz Winter Drive Franklin KY, 42134 USA

September 18, 2024

Re: Fritz Winter North America, LP
Agency Interest: 129745
Permit ID: V-16-022-R1
Request to Add Backup Generator

Dear Sir or Madam:

Fritz Winter North America, LP (Fritz Winter) respectfully submits this cover letter to to inform that Fritz Winter plans to add a Cummins RS20AC natural gas backup generator to the computer server room. As part of the submittal, the RS20AC Spec Sheet and a Potential to Emit (PTE) have been attached.

We hope this information is sufficient for your needs. Should you have any questions or need any additional information, please contact Jordan Smith, Environmental Engineer, at (812) 585-9106 or Jordan.Smith@fritzwinter.us.

Sincerely,

Jordan Smith, Environmental Enginner

Specification sheet

Quiet Connect™ Series - RS13A, RS17A, RS20A, & RS20AC

Features and benefits

Robust Design – The generator is designed to operate in cold weather with performance down to 0 °F (-18 °C) out of the box. The extreme cold weather models can perform down to -40 °F (-40 °C) out of the box. It is tested and certified per the latest EPA, UL, and CSA standards. The generator meets NFPA 37 which allows it to be installed 18 inches from a building. It has powerful motor starting ability and can easily start and run a 5-ton A/C[1] under full pre-load.

Intelligent Load Management - The generator can control up to 4 loads and continuously monitors how much power is required independently for each load. It then controls each load for maximum utilization of generator power by only restoring loads the generator has capacity to run.

Flexible Exercise Modes - Exercise modes can be set for time, date, and frequency that suits the owner. Our patented 'Crank only' exercise mode allows the generator to crank the engine and run diagnostics without starting the engine. This reduces wear and tear on the engine, fuel costs, and further reduces the sound of an already quiet generator.

Remote Monitoring - Remote monitoring is built into every generator. Using a computer, tablet, or smart phone, an operator can monitor, change exercise modes, and manually run the generator remotely.

Generator and ATS packaged sets – The RS20AC comes with a 20-kW generator and 200A service entrance rated ATS in one box to make ordering more convenient.

Weight, size and sound level

Size: Length: 34.1 in (865 mm), Width: 36.0 in (915 mm), Height: 27.3 in (694 mm)

Sound: 65 dB(A) at 23 ft. (7 m) at normal load[2]

Voltage / Frequency: 120/240V / 60Hz

Series	Model	Part number	Extreme Cold Weather	Rated amp[3] (NG / LPV)	Weight Lbs. / Kg
RS13A	C13N6H	A061C591	No	54.2 / 54.2	479 / 217
RS17A	C17N6H	A061C596	No	70.8 / 70.8	531 / 241
RS20A	C20N6H	A061C601	No	75 / 83.3	531 / 241
RS20AC	C20N6HC	A061C602	No	75 / 83.3	596 / 271
RS13AE	C13N6H	A062E510	Yes	54.2 / 54.2	479 / 217
RS17AE	C17N6H	A062E511	Yes	70.8 / 70.8	531 / 241
RS20AE	C20N6H	A062E512	Yes	75 / 83.3	531 / 241
RS20ACE	C20N6HC	A062E513	Yes	75 / 83.3	596 / 271

[1] Air-conditioners vary by type, operational conditions, etc. Consult with a qualified Cummins Power Generation distributor/dealer for proper sizing.

[2] Quietest point at a normal load. Sound performance may be affected by installation.

[3] Derating guidelines: Maximum wattage or maximum current are subject to and limited by such factors as fuel Btu content, ambient temperature, altitude, engine power and condition, etc. Full rated power available up to the following, derate 3.5% for each increase of 300 m (1000 ft.) and 1% for each increase of 5.5 °C (10 °F) after that:
RS20A & R20AC – at 15 °C (60 °F) and 0 m (0 ft.).
RS17A - at 25 °C (77 °F) and 300 m (1000 ft.)
RS13A – at 25 °C (77 °F) and 2100 m (6900 ft.)

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Product Features

Engine
- Natural gas/propane
- Engine air cleaner
- Engine oil (Synthetic)
- Oil drain extension tube
- Low oil pressure shutdown

Fuel System
- Single fuel – natural gas or propane vapor, field selectable (Set to Natural gas from factory)

Alternator
- 60 Hz, 1 phase, < 5% THD (total harmonic distortion)
- Long life electrographic DC brushes
- Slip ring heater

Control
- Display language – English
- Under hood built in display

Electrical
- Single 100A circuit breaker, UL certified (On all models)
- Battery charging alternator
- Battery charger – 4 Amps

Cooling
- Single direct drive blower

Enclosure
- Aluminum exterior, galvanized steel interior
- Evaluated to withstand 180 MPH wind loads in accordance with ASCE7-10

Code Compliance
- UL 2200
- CSA 22.2 and B149.1
- EPA emissions
- NFPA 37 – 18 inches

Warranty
- Base: 5 years / 2000 hours
- Extended warranties available

Generator Set performance

Voltage regulation, no load to full load: ±1.25%
Steady state voltage variation: ±1.25%
Frequency regulation: Isochronous
Motor starting kVA (30% voltage dip): 40 for RS20A/AC, 34 for RS17A, and 26 for RS13A
Steady state freq. variation: ±1.25% (±1.5% @ No load)
Operating temperature: 122 °F (50 °C) to -40 °F (-40 °C)
See Accessories section for details on kits

Engine

Model: QSJ999G
Design: Naturally aspirated, V twin air cooled
Bore: 3.54 in (89.9 mm)
Stroke: 3.09 in (78.5 mm)
Displacement: 60.96 inch^3 (999 CC)
Cylinder block: Aluminum
Battery capacity: Group 51R, 450 CCA at ambient temperature of 32 °F (0 °C)
Starting voltage: 12 volt, negative ground
Oil Filter type: Spin-on
Rated speed: 3600 rpm

Fuel supply pressure

Minimum - in H2O (kPa):
NG - 3.5 (0.87) / LP - 6.0 (1.49)
Maximum - in H2O (kPa):
NG - 12.0 (3.0) / LP - 12.0 (3.0)

Average fuel consumption

RS13A Fuel consumption – natural gas

Load:	1/4	1/2	3/4	Full
Ft^3 / hr.	129	154	187	228
M^3 / hr.	3.7	4.4	5.3	6.5
BTU / hr.	123028	146534	178640	217227

RS13A Fuel consumption – LP vapor

Load:	1/4	1/2	3/4	Full
Ft^3 / hr.	42	51	64	83
M^3 / hr.	1.2	1.4	1.8	2.3
BTU / hr.	98852	121723	152253	197681

RS17A Fuel consumption – natural gas

Load:	1/4	1/2	3/4	Full
Ft^3 / hr.	134	165	215	258
M^3 / hr.	3.8	4.7	6.1	7.3
BTU / hr.	127745	157870	205464	245954

RS17A Fuel consumption – LP vapor

Load:	1/4	1/2	3/4	Full
Ft^3 / hr.	48	63	82	102
M^3 / hr.	1.4	1.8	2.3	2.9
BTU / hr.	114082	148026	194392	242386

RS20A & RS20AC Fuel consumption – natural gas

Load:	1/4	1/2	3/4	Full
Ft^3 / hr.	135	172	223	268
M^3 / hr.	3.8	4.9	6.3	7.6
BTU / hr.	128822	163890	212731	255947

RS20A & RS20AC Fuel consumption – LP vapor

Load:	1/4	1/2	3/4	Full
Ft^3 / hr.	49	66	88	112
M^3 / hr.	1.4	1.9	2.5	3.2
BTU / hr.	117208	157482	209404	265783

Nominal fuel rating – 1000 BTU / ft^3 (37 MJ / M^3)

Conversion factor:
8.58 ft^3 = 1 lb.
0.535m^3 = 1 kg
36.39 ft^3 = 1 gal
1.02m^3 = 1 gal (LPG)

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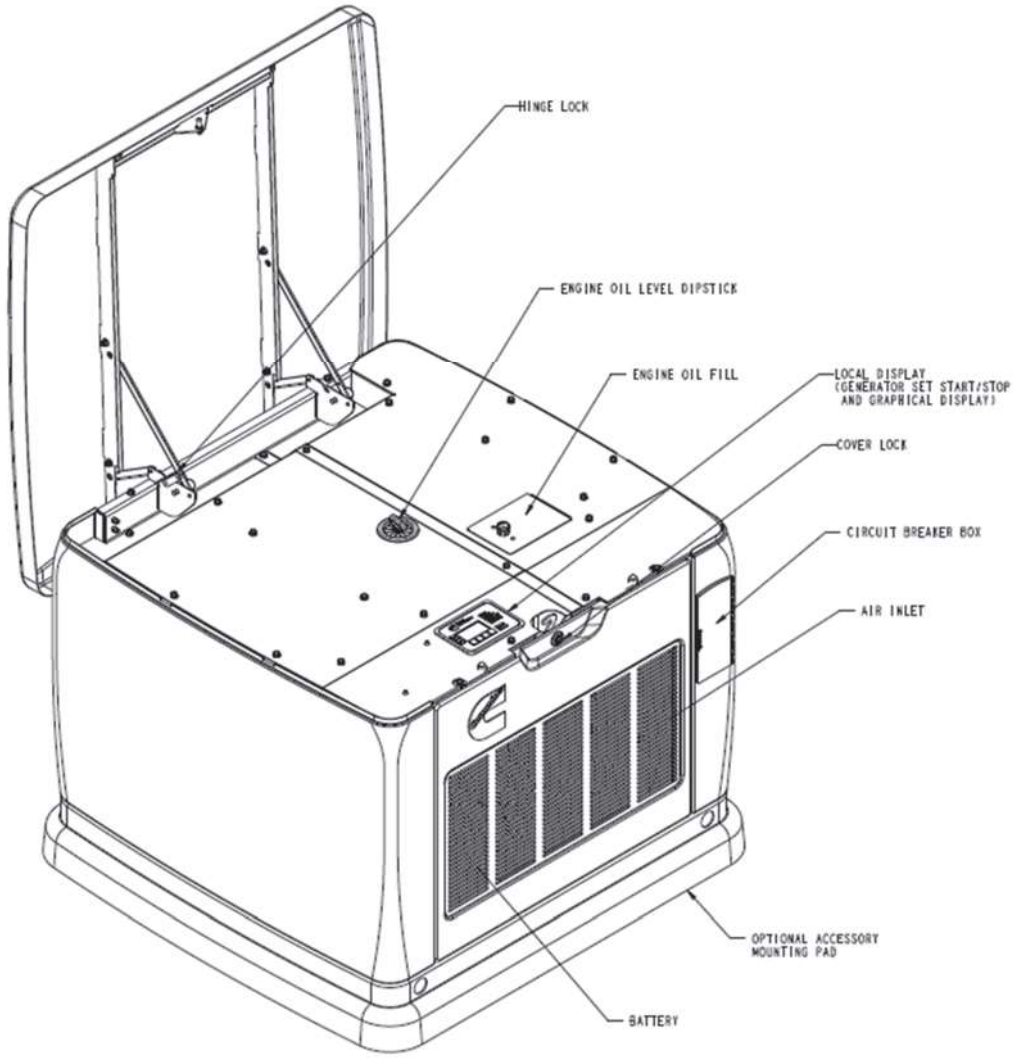
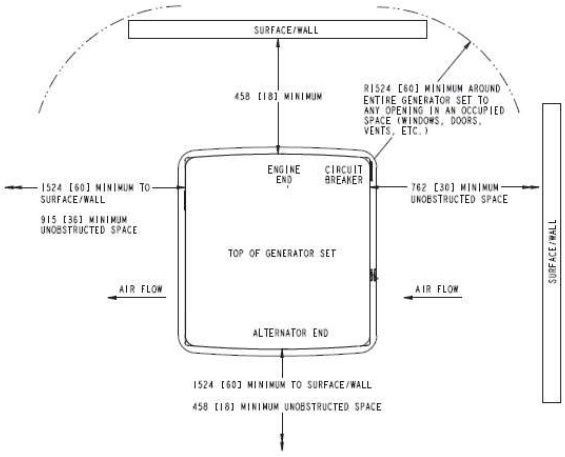
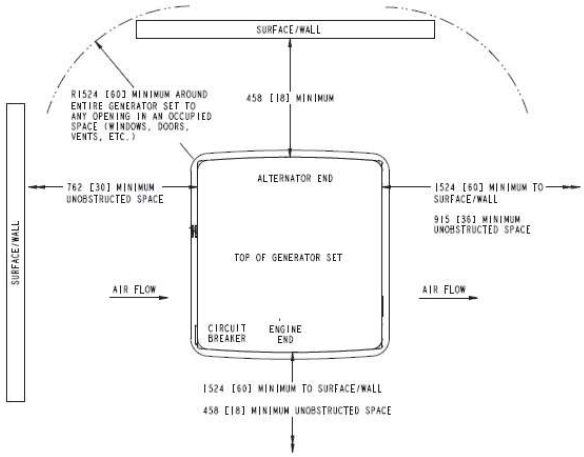
Easy service and installation







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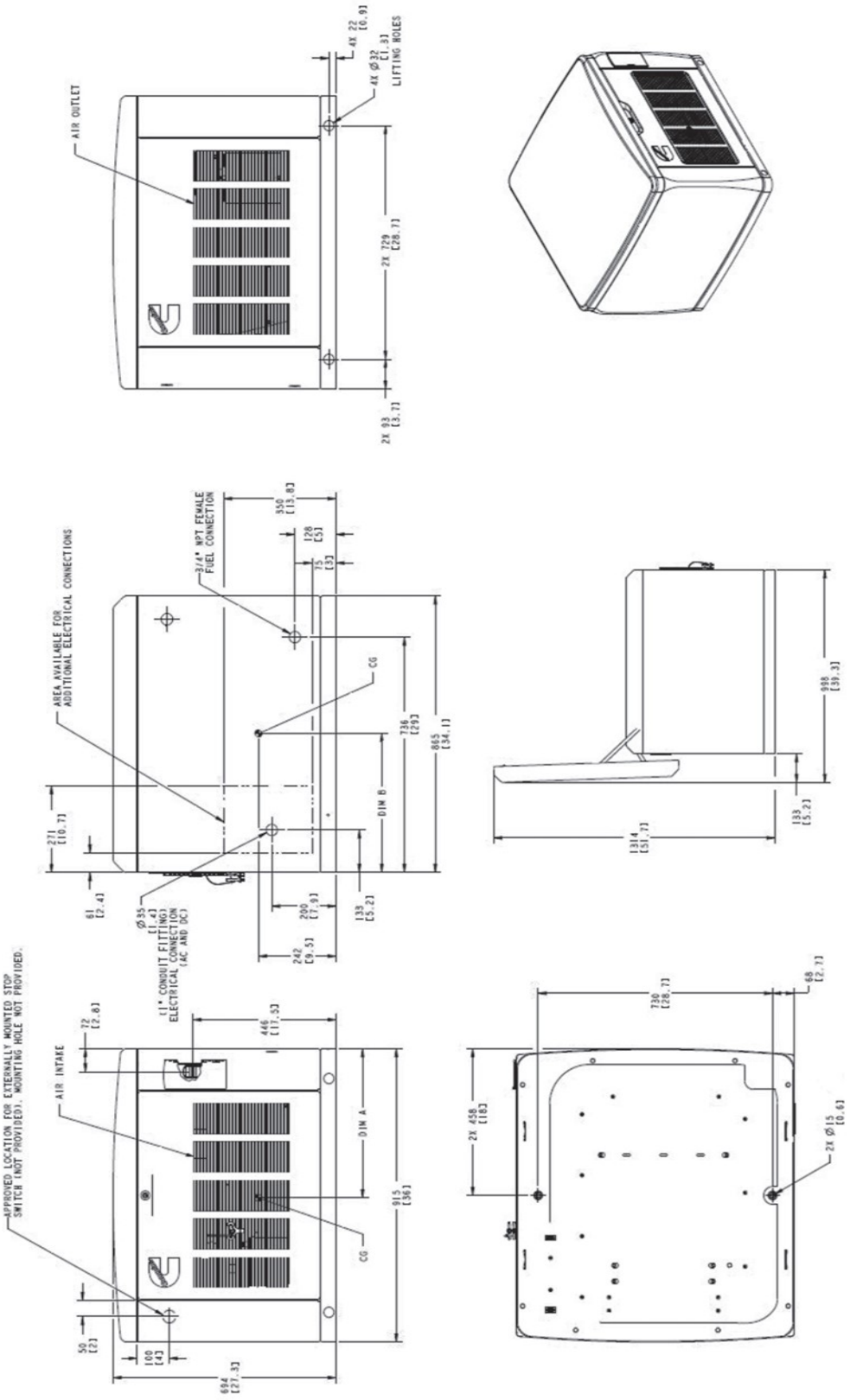
Basic dimension



Note: This outline drawing provides general reference only and is not intended for use in design or installation. For more information, see Operators and Installation manuals or contact your distributor or dealer for assistance.

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Accessories

- RS In-home display (A053K028) - Additional interface and display to monitor generator performance from a second location.
- Extreme Cold Weather Kit (A054B984) – For locations where the generator will be in climates that can go below 0 °F (-18 °C). Not needed on extreme cold weather models.
- Enclosure Paint Touchup Kit (A043J735)
- Preventative Maintenance Kit (A054H068) – Parts for scheduled maintenance intervals
- Load Add/Load Shed Device (A051C329) – Allows generator to control up to 2 - 50A loads
- Integrated ATS & Load Panel (A051C991) – Combines an 100A Non-Service Entrance (NSE) ATS with a load panel in an NEMA 1 box
- Concrete Composite Mounting Pad - 3" thick, 1" overhang composite pad for mounting the generator on (A052A795 for a single pad, A057M349 for 5 pads, and A057M351 for 10 pads)
- E-stop Kit (A044Z051) - Externally mounted emergency stop button allows for additional safety
- Battery (A052Y816) - Group 51R, 450 CCA

⚠ WARNING:

Standby rating based on: Applicable for supplying emergency power for the duration of normal power interruption. No sustained overload capability is available for this rating. (Equivalent to fuel stop power in accordance with ISO3046, AS2789, DIN6271 and BS5514 nominally rated.) See T030.

⚠ WARNING:

Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building electrical except through an approved device or after building main breaker is open.

Transfer switch (also sold separately)

- Automatic Transfer Switches available in various amperages.
- Service Entrance and Non-Service Entrances models are available.
- Available for both Indoor and Outdoor applications.
- All models UL listed to UL 1008 standard.
- Compatibility with the Cummins generator set helps reduce the installation time for the complete application.

Warranty policy

The Cummins Power Generation RS13A, RS17A, RS20A, and RS20AC generators come standard with a 5 year / 2,000 hour limited warranty. RA Automatic Transfer Switches come standard with a 2 year warranty. Extended warranty options available. See warranty statement for additional details.

After sale support

Largest distributor/dealer support network

Cummins Power Generation generator sets are supported by the largest and best trained worldwide certified distributor/dealer network in the industry. This network of knowledgeable distributor/dealers will help you select and install the right generator set and accessories to meet the requirements of your specific application. This same network offers a complete selection of commonly used generator set maintenance parts, accessories and products plus manuals and specification sheets. Plus, they can answer your questions regarding proper operation, maintenance schedules and more.

Manuals: Operation and installation manuals ship with the generator set. To obtain additional copies or other manuals for this model, see your distributor/dealer. To easily locate the nearest certified distributor/dealer for Cummins Power Generation generators in your area, or for more information, contact us at 1-800-888-6626 or visit power.cummins.com.

Contact your distributor/dealer for more information.

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