

Commonwealth of Kentucky
Division for Air Quality
STATEMENT OF BASIS / SUMMARY

Conditional Major, Construction/Operating
Permit: F-24-047
Ensign-Bickford Aerospace & Defense Company
500 Bickford Rd.
Graham, KY 42344
October 25, 2024

Amy K. Tempus-Doom, P.E., Reviewer
SOURCE ID: 21-177-00079
AGENCY INTEREST: 40689
ACTIVITY: APE20220001

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SECTION 1 – SOURCE DESCRIPTION

SIC Code and description: 2892, Explosives Manufacturing

Single Source Det. Yes No If Yes, Affiliated Source AI: 3241 (Separate source)

Source-wide Limit Yes No If Yes, See Section 4, Table A

28 Source Category Yes No If Yes, Category:

County: Muhlenberg

Nonattainment Area N/A PM₁₀ PM_{2.5} CO NO_x SO₂ Ozone Lead

If yes, list Classification:

PTE* greater than 100 tpy for any criteria air pollutant Yes No

If yes, for what pollutant(s)?

PM₁₀ PM_{2.5} CO NO_x SO₂ VOC

PTE* greater than 250 tpy for any criteria air pollutant Yes No

If yes, for what pollutant(s)?

PM₁₀ PM_{2.5} CO NO_x SO₂ VOC

PTE* greater than 10 tpy for any single hazardous air pollutant (HAP) Yes No

If yes, list which pollutant(s): Dichloromethane, Xylenes (Total)

PTE* greater than 25 tpy for combined HAP Yes No

*PTE does not include self-imposed emission limitations.

Description of Facility:

Ensign-Bickford Aerospace & Defense Company (EBA&D) is a manufacturer of explosive products serving both the Aerospace & Defense industries. The Graham, KY facility manufactures cast-cure products via mixing and blending processes for military applications, extruded plastic bonded explosive for both military and commercial markets, as well as demolition and mine breaching systems. The Multiple Reaction Facility (MRF) at this facility utilizes chemical processes such as dissolution/recrystallization, vacuum stripping, and other chemical batch processes to create products such as MAPO (Methyl Aziridinly Phosphine oxide) and GAP (Glycidyl Azide Polymer).

SECTION 2 – CURRENT APPLICATION AND EMISSION SUMMARY FORM

Permit Number: F-24-047

Activity: APE20220001

Application Received: August 23, 2022 Application Complete Date(s): October 23, 2022

Permit Action: Initial Renewal Significant Rev Minor Rev Administrative

Construction/Modification Requested? Yes No

Previous 502(b)(10) or Off-Permit Changes incorporated with this permit action Yes No

Description of Action:

Ensign-Bickford Aerospace & Defense Company (EBA&D) submitted an application for a renewal conditional major permit on August 23, 2022. With this permit renewal F-24-047, the following changes have been made to the permit:

- In a NOD sent on June 19, 2023, the Division requested that EBA&D assess the applicability of the requirements to 40 CFR 60, Subpart VV to the operations at the facility. The facility submitted an updated DEP7007V form on June 26, 2023. Based on the information provided, the stainless steel reactor (RX915), Nash Vacuum Pump (VP001), Busch Vacuum Pump (VP518), Stainless Steel Vacuum Receiver (VR002), and MAPO Condenser (HX3011) are all components that would potentially be subject to the requirements of Subpart VV, but are in vacuum service and are exempt from most requirements of Subpart VV. The facility identified that the MAPO Shell & Tube Heat Exchanger (HX536), IBIB/Xylene Tank (TK503), and the MeCl Tanks (TK3000 and TK3001), are not in vacuum service and are subject to the applicable requirements of Subpart VV.
- On October 24, 2024, EBA&D also submitted revised information for the MeCl tanks, and a request to rename them due to changes in site nomenclature. TK3000 has been renamed to TK600, and TK3001 has been renamed to TK601. TK601 also previously identified an incorrect capacity of 5,000 gallons. The correct size for this tank is 1,400 gallons, the same as the TK600 tank.
- Permit language was updated to be consistent and clear.

F-24- Emission Summary		
Pollutant	2023 Actual (tpy)	PTE F-24-047 (tpy)
CO	0.20	2.61
NOx	0.24	3.36
PT	0.07	19.78
PM ₁₀	0.07	19.78
PM _{2.5}	0.03	8.99
SO ₂	0.001	0.015
VOC	1.01	98.38*
Lead	1.2 x 10 ⁻⁶	1.05 x 10 ⁻⁵
Greenhouse Gases (GHGs)		
Carbon Dioxide	287	2,509
Methane	0.006	0.047
Nitrous Oxide	0.005	0.0047

F-24- Emission Summary		
Pollutant	2023 Actual (tpy)	PTE F-24-047 (tpy)
CO ₂ Equivalent (CO ₂ e)	289	2,511
Hazardous Air Pollutants (HAPs)		
Dichloromethane	0	91.11
Xylenes (Total)	0.34	8.92
1,2-Propylenimine	0	0.034
Hexane	--	0.038
Formaldehyde	0.0002	0.0016
Combined HAPs:	0.34	100.1*

*Note: The permit contains federally enforceable emission limitations to limit emissions below major source thresholds.

SECTION 3 – EMISSIONS, LIMITATIONS AND BASIS

EP 13MIEH - MRF Heat Exchanger				
Pollutant	Emission Limit or Standard	Regulatory Basis for Emission Limit or Standard	Emission Factor Used and Basis	Compliance Method
PM	0.56 lb/MMBtu	401 KAR 59:015, Section 4(1)(a)	AP-42 Chapter 1.4.	Assumed based upon natural gas combustion
Opacity	20% opacity	401 KAR 59:015, Section 4(2)	N/A	Assumed based upon natural gas combustion
SO ₂	3.0 lbs/MMBtu	401 KAR 59:015, Section 5(1)	AP-42 Chapter 1.4.	Assumed based upon natural gas combustion
Initial Construction Date: 1994				
Process Description: Type: Cleveland Brooks LFME-12 (Serial # 0-14085) Maximum Rating: 5 MMBtu/hr Control Device: None Fuel: Natural Gas				
Applicable Regulation: 401 KAR 59:015 , <i>New indirect heat exchangers</i> , applicable to indirect heat exchangers having a heat input capacity greater than one (1) million BTU per hour (MMBtu/hr) commenced on or after April 9, 1972.				
State-Origin Requirements: 401 KAR 63:020 , <i>Potentially hazardous matter or toxic substances</i> .				
Comments: Emissions calculated using AP-42, Chapter 1.4 and 40 CFR 98, Subpart C.				

Emission Unit 10 (EU 10): Multiple Reaction Facility (MRF); EU 08 - Methylene Chloride; & EU 09 - GAP
Initial Construction and/or Modification Date: see below.
Process Description: Emission Unit 10 (EU 10): Multiple Reaction Facility (MRF) EP 10-17 MRF MAPO Production Construction Date: October 1991 Components: 1000 gallon Stainless Steel Reactor (RX915) Manufacturer: Pfaudler Model: E380-1410 High Volume / Low Vacuum Nash Vacuum Pump (VP001) Manufacturer: Nash Model: CH 9626 EB

Emission Unit 10 (EU 10): Multiple Reaction Facility (MRF); EU 08 - Methylene Chloride; & EU 09 - GAP

Low Volume / High Vacuum Busch Vacuum Pump (VP518)
Manufacturer: Busch
Model: Hucke pack H00437, FIH6, 1111 Vacuum Pump

MAPO Shell & Tube Heat Exchanger (HX536)
600-Gallon Stainless Steel Vacuum Receiver (VR6000)
MAPO Condenser (HX3011)

Control Device # 1: MAPO Shell & Tube Heat Exchanger (HX536)
Manufacturer: ITT Standard
Model: 04024 SSCF
Install date: 1998

Control Device # 2: MAPO Condenser (HX3011)
Manufacturer: ITT Standard
Model: 08066 SSCF-C
Install Date: 2008

Overall Control Efficiency: 80%

EP 10-25 GAP-1 and GAP-2 (Glycidyl Azide Polymer)

Construction Date: October 1991
Components:
1000 gallon Stainless Steel Reactor (RX915)
Manufacturer: Pfaudler
Model: E380-1410

Low Volume / High Vacuum Busch Vacuum Pump (VP518)
Manufacturer: Busch
Model: Huckepack H00437, FIH6 1111 Vacuum Pump

ITT Standard Shell & Tube Heat Exchanger (HX536)

600-gallon Stainless Steel Vacuum Receiver (VR6000)
Control device: GAP Shell & Tube Heat Exchanger (HX536)
Manufacturer: ITT Standard
Model: 04024 SSCF
Install date: 1998
Efficiency: 89.1%

Tanks:

EU 08 Methylene Chloride:

EP 8MTF6 (TK601)

MRF 99% MeCl Raw Material Storage Tank

Construction Date: October 1996
Capacity: 1,400 gallons
Control Device: None

Emission Unit 10 (EU 10): Multiple Reaction Facility (MRF); EU 08 - Methylene Chloride; & EU 09 - GAP

EP 8MTF7 (TK600)

MRF 99% MeCl Recovery Tank

Construction Date: October 1991
Capacity: 1,400 gallons
Control Device: None

EU 09 GAP:

EP 09MTF12 (TK503)

MRF Isobutyl Isobutyrate/Xylene Recovery Tank

Construction Date: October 1991
Capacity: 5,000 gallons
Control Device: None

Applicable Regulation:

401 KAR 60:005, Section 2(2)(bbb), 40 C.F.R. 60.480 through 60.489 (Subpart VV), *Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After January 5, 1981, and on or Before November 7, 2006*, applies to affected facilities in the synthetic organic chemicals manufacturing industry that commences construction, reconstruction, or modification after January 5, 1981, and on or before November 7, 2006.

State-Origin Requirements:

401 KAR 63:020, *Potentially hazardous matter or toxic substances.*

Precluded Regulations:

401 KAR 51:017, *Prevention of significant deterioration of air quality*, precluded by taking a source-wide emission limit for VOC.

Comments:

The facility has indicated that all processes except EP 10-07 (HX536), EP 8MTF6, EP 8MTF7, & EP 09MTF12 are in vacuum service.

EP 10-17: Emissions from the MAPO process consist of methylene chloride and propyleneimine, both regulated Hazardous Air Pollutants (HAPs). Methylene chloride, the only HAP emitted in significant quantities, is emitted from the batch reactor, two storage tanks, two boil tanks, and fugitive leaks from transfer equipment. Emissions are reduced by operation of a condenser to recover at least 80% of the methylene chloride.

EP 10-25: Emissions from the reaction process are controlled by a condenser that reduces emissions by a minimum of 88%.

Tank emissions were calculated using US EPA TANKS V. 4.09 for emission points 11, 08 and 09.

EP 10-17 (MAPO production) and EP 10-25 (GAP-1 and GAP-2) emission calculations are based on material balance.

Tanks TK600 and TK601 were previously named TK3000 and TK3001.

EP 99 (99) - Outdoor Test Site

Initial Construction Date: 2000

Process Description: Explosives detonation for quality control, R&D, and product demonstrations

Maximum Rating: 8 lb/hr net explosive weight

Control Device: None

Applicable Regulation:

401 KAR 63:010, *Fugitive emissions*, applies to each apparatus, operation, or road which emits or may emit fugitive emissions provided that the fugitive emissions from such facility are not elsewhere subject to an opacity standard within the administrative regulations of the Division for Air Quality.

Comments:

Emissions calculated using AP-42, Chapter 15.

SECTION 3 – EMISSIONS, LIMITATIONS AND BASIS (CONTINUED)

Testing Requirements/Results

Note: The source conducts mass balance calculations in lieu of performance testing.

SECTION 4 – SOURCE INFORMATION AND REQUIREMENTS

Table A - Group Requirements:

Emission and Operating Limit	Regulation	Emission Unit
90 tpy of VOC emissions	To preclude 401 KAR 52:020 and 401 KAR 51:017	Source-wide
9.0 tpy of individual HAP emissions	To preclude major source status for HAP	Source-wide
22.5 tpy of combined HAP emissions	To preclude major source status for HAP	Source-wide

Table B - Summary of Applicable Regulations:

Applicable Regulations	Emission Unit
401 KAR 59:015 , <i>New indirect heat exchangers</i> , applicable to indirect heat exchangers having a heat input capacity greater than one (1) million BTU per hour (MMBtu/hr) commenced on or after April 9, 1972.	EP 13MIEH
401 KAR 63:020 , <i>Potentially hazardous matter or toxic substances</i> .	EP 13MIEH, EU 10, EU 08, EU 09
401 KAR 60:005, Section 2(2)(bbb), 40 C.F.R. 60.480 through 60.489 (Subpart VV) , <i>Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After January 5, 1981, and on or Before November 7, 2006</i> , applies to affected facilities in the synthetic organic chemicals manufacturing industry that commences construction, reconstruction, or modification after January 5, 1981, and on or before November 7, 2006.	EP 10-07 (HX536), EP 8MTF6, EP 8MTF7, & EP 09MTF12
401 KAR 63:010 , <i>Fugitive emissions</i> , applies to each apparatus, operation, or road which emits or may emit fugitive emissions provided that the fugitive emissions from such facility are not elsewhere subject to an opacity standard within the administrative regulations of the Division for Air Quality.	EP 99

Table C - Summary of Precluded Regulations:

Precluded Regulations	Emission Unit
401 KAR 51:017 , <i>Prevention of significant deterioration of air quality</i> , precluded by taking a source-wide emission limit for VOC.	Source-wide

SECTION 4 – SOURCE INFORMATION AND REQUIREMENTS (CONTINUED)

Table D - Summary of Non Applicable Regulations:

N/A

Air Toxic Analysis

401 KAR 63:020, *Potentially Hazardous Matter or Toxic Substances*

The Division for Air Quality (Division) has performed modeling in October 1995 of potentially hazardous matter or toxic substances that may be emitted by the facility based upon the process rates, material formulations, stack heights and other pertinent information provided by the applicant. Based upon this information, the Division has determined that the conditions outlined in this permit will assure compliance with the requirements of 401 KAR 63:020.

Single Source Determination

In December 1998, a Conditional Major permit application was submitted on behalf of The Ensign-Bickford Company for the facility located at State Route 175, Graham, KY. On December 31, 2000, The Ensign-Bickford Company (EBCo) split into two companies: (1) The Ensign-Bickford Company, and (2) Ensign Bickford Aerospace & Defense Company. Both of these companies were subsidiaries of the parent company, Ensign-Bickford Industries, Inc. During May 2003, The Ensign-Bickford Company merged with Dyno Nobel, Inc., and the Graham, KY assets of The Ensign-Brickford Company were acquired by Dyno Nobel Inc.

To account for the aforementioned changes in company ownership, a revised permit application was submitted to the Division in April 2003. The revised application separated the emission sources contained in the 1998 application into EBA&D emission sources and Dyno Nobel, Inc. emission sources (previously EBCo sources). In February 2007, a new application was submitted to the Division that contained only Ensign-Bickford Aerospace & Defense Company emission facilities. Equipment and pollutant emitting activities attributable to Dyno Nobel have been reviewed and approved by the Division under a separate permit to operate under AI 3241.

SECTION 5 – PERMITTING HISTORY

Permit	Permit Type	Activity#	Complete Date	Issuance Date	Summary of Action	PSD/Syn Minor
C-92-035 R1	Const. Permit Rev.	APE20050001	1/13/1992	10/31/1997	Const. Permit Rev.	N/A
S-96-025	Initial	APE20050002	1/5/1996	2/6/1996	Initial State-Origin Permit	N/A
F-07-017	Initial	APE20070001	4/17/2007	9/21/2007	Initial Cond Major Permit	Synthetic Minor
F-07-017 R1	Mnr Rev	APE20080002	9/7/2008	9/24/2008	Addition of EP 10(17)	N/A
F-07-017 R2	Mnr Rev	APE20090003	9/9/2009	10/22/2009	Addition of solvent	N/A
F-12-041	Renewal	APE20120001	6/22/2012	10/29/2017	Renewal	N/A
F-17-046	Renewal	APE20170001	8/29/2017	12/17/2017	Renewal	N/A

SECTION 6 – PERMIT APPLICATION HISTORY

None

APPENDIX A – ABBREVIATIONS AND ACRONYMS

AAQS	– Ambient Air Quality Standards
BACT	– Best Available Control Technology
Btu	– British thermal unit
CAM	– Compliance Assurance Monitoring
CO	– Carbon Monoxide
Division	– Kentucky Division for Air Quality
ESP	– Electrostatic Precipitator
GHG	– Greenhouse Gas
HAP	– Hazardous Air Pollutant
HF	– Hydrogen Fluoride (Gaseous)
MSDS	– Material Safety Data Sheets
mmHg	– Millimeter of mercury column height
NAAQS	– National Ambient Air Quality Standards
NESHAP	– National Emissions Standards for Hazardous Air Pollutants
NO _x	– Nitrogen Oxides
NSR	– New Source Review
PM	– Particulate Matter
PM ₁₀	– Particulate Matter equal to or smaller than 10 micrometers
PM _{2.5}	– Particulate Matter equal to or smaller than 2.5 micrometers
PSD	– Prevention of Significant Deterioration
PTE	– Potential to Emit
SO ₂	– Sulfur Dioxide
TF	– Total Fluoride (Particulate & Gaseous)
VOC	– Volatile Organic Compounds