Commonwealth of Kentucky
Division for Air Quality

REVISED STATEMENT OF BASIS / SUMMARY

Title V, Operating
Permit: V-20-022 R2
Westlake Chemical OpCo LP
2468 Industrial Parkway
Calvert City, KY 42029
May 30, 2025
Brian Harley, Reviewer

SOURCE ID:	21-157-00080
AGENCY INTEREST:	122899
ACTIVITY:	APE20220006, APE20220007, APE20230002, APE20230003, APE20230004

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SECTION 1 – SOURCE DESCRIPTION

SIC Code and description: 2869, Industrial Organic Chemicals, NEC (except aliphatics, carbon bisulfide, ethyl alcohol, cyclopropane, diethylcyclohexane, napthalene sulfonic acid, synthetic hydraulic fluids, and fluorocarbon gases)

Single Source Det. ☒ Yes ☐ No If Yes, Affiliated Source AI: 2966 and 2967

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

28 Source Category ☒ Yes ☐ No If Yes, Category: Chemical process plants, except ethanol production facilities producing ethanol by natural fermentation under NAICS codes 325193 or 312140

County: Marshall
Nonattainment Area ☒ N/A ☐ PM_{10} ☐ $PM_{2.5}$ ☐ CO ☐ NO_X ☐ SO_2 ☐ Ozone ☐ Lead

PTE* greater than 100 tpy for any criteria air pollutant ☒ Yes ☐ No
If yes, for what pollutant(s)?
☐ PM_{10} ☐ $PM_{2.5}$ ☒ CO ☒ NO_X ☐ SO_2 ☒ VOC

PTE* greater than 250 tpy for any criteria air pollutant ☒ Yes ☐ No
If yes, for what pollutant(s)?
☐ PM_{10} ☐ $PM_{2.5}$ ☒ CO ☐ NO_X ☐ SO_2 ☐ VOC

PTE* greater than 10 tpy for any single hazardous air pollutant (HAP) ☒ Yes ☐ No
If yes, list which pollutant(s): Benzene

PTE* greater than 25 tpy for combined HAP ☒ Yes ☐ No

*PTE does not include self-imposed emission limitations.

Description of Facility:
The primary function of the Westlake OpCo Plant is to produce high-purity ethylene through thermal cracking of ethane feedstock to produce co-products including propylene, mixed C-4's, aromatic gasoline, fuel oil, and fuel gas. This is performed by high-temperature cracking furnaces.

Effluent gas leaving the furnaces is cooled to control and stabilize effluent reactions while generating steam. A series of transfer line exchangers (TLEs) is used to generate saturated 435-psig steam which is superheated and used to drive the ethylene refrigeration compressor turbine.

After the TLEs, the furnace effluent stream enters the quench system in which quench water enters the column to scrub oils, tars and carbon particles from the effluent gases as they travel up the column. The water-saturated overhead vapors flow to the feed gas compressor system. The heavy hydrocarbons present in the furnace effluent are condensed in the quench column and mix with the circulating water. The net quench water is drawn from the system and flows to a series of separators and accumulators where light distillate, heavy oil, water and oily water mixtures are

segregated. The light distillate is routed to the gasoline column feed tank for processing through the gasoline column.

The heavy oil is transferred directly to the gasoline column. Oily water mixtures flow from the separators directly to the Ethylene Plant's wastewater pretreatment system for removal of any free oil and benzene.

The water-saturated hydrocarbon vapors leave the quench column and enter the multi-stage feed gas compressor system. Injection oil is pumped from a storage tank at regimented flow rates into each stage of compression (to prevent the build-up of polymer in the compressor case).

Acid gases generated during the pyrolysis phase are removed to produce high-purity products and co-products. A caustic wash system removes these acid gases between compression stages. Condensed hydrocarbons and spent caustic emulsions from the caustic wash system are transferred to collection tanks for neutralization and then flow to the ethylene wastewater pre-treatment unit. The compressed process gas stream is fed to the distillation area.

In the distillation area, the process gas stream enters desiccant dryers and undergoes low temperature processing and separation. The dried gas stream is pre-cooled in consecutive exchangers before being fed to a series of distillation units including the de-methanizer, de-ethanizer, de-propanizer, propylene column, ethylene column, secondary de-methanizer, de-butanizer column, and gasoline columns. The distillation area also includes acetylene reactors for removing acetylene by reacting it with hydrogen. Products from these distillation operations include high-purity ethylene, propylene, mixed C-4’s, aromatic gasoline, fuel oil, and process fuel gas. Ethylene is used as a raw material in the Monomers Plant and process fuel gas is distributed for use as fuel in various combustion units throughout the facility.

Westlake Chemical OpCo LP (Westlake OpCo), Westlake Vinyls, Inc. – Vinyls Plant and Westlake Vinyls, Inc. – PVC Plant are all subsidiaries of Westlake Corporation. The three facilities are considered a single source.

SECTION 2 – CURRENT APPLICATION AND EMISSION SUMMARY FORM

Permit Number: V-20-022 R2 Activities: APE20220006, APE20220007

Application:	Received Date(s):	Application Complete Date(s):
APE20220006	September 23, 2022	January 23, 2023
APE20220007	October 18, 2022	January 27, 2023
APE20230002	June 28, 2023	April 30, 2024
APE20230003	July 17, 2023	April 30, 2024
APE20230004	October 13, 2023	May 2, 2024

Permit Action: ☐ Initial ☐ Renewal ☒ Significant Rev ☒ Minor Rev ☒ Administrative

Construction/Modification Requested? ☐Yes ☒No NSR Applicable? ☐Yes ☒No

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

Description of Action:
APE20220006 (Administrative Amendment):

- On a corporate level, Westlake Chemical Corporation has been renamed to Westlake Corporation effective on September 30, 2022. However, the permittee/source name of Westlake Chemical OpCo LP has not changed.
- No change in emissions occurred as a result of the Administrative Amendment.

APE20220007 (Minor Revision):

- Permit V-20-022 incorporated the 502(b)(10) Change received by the Division on March 10, 2020 for the implementation of an Advanced Process Control (APC) System to optimize operations in the Ethylene Plant. With the implementation of the APC System it was estimated that actual emissions of regulated air pollutants would be increased without any changes to the PTE of Furnaces 1, 2, 3, 7, 8, or 9.
- With the implementation of the APC System it was found that the emissions of Furnaces 1, 2, 3, and 7 were not only increased on an actual emissions basis, but also on a PTE basis due to an actual increase in the firing rates of Furnaces 1, 2, 3, and 7. Furnaces 1, 2, and 3 will be able to reach firing rates higher than the 24-hr average firing rates that were permitted by permit V-20-022 and Furnaces 1, 2, 3, and 7 will be able to reach firing rates higher than the 12-month rolling firing rates as permitted by permit V-20-022. Therefore a minor revision was received by the Division to modify the permitted Firing Rates.
- The expected optimization would increase the actual capacity of the facility by 3.5 MMlb/yr of ethylene and is unrelated to the PSD 2020 Expansion Project.
- The firing rates (on a mmBtu/hr basis) will be increased as follows:

EPN	Description	V-20-022 24-hr avg Firing Rate	V-20-022 12-month rolling Firing Rate	V-20-022 R2 24-hr avg Firing Rate	V-20-022 R2 12-month rolling Firing Rate
305	Cracking Furnace #1	184	150	190	170
306	Cracking Furnace #2	184	150	190	170
307	Cracking Furnace #3	184	150	190	170
311	Cracking Furnace #7	105	80	105	90

- The BAE of the emission units affected by the increased production related to the APC System are based on 24-month period between March, 2018 and February, 2020 and the PAE of the affected emission units is based on the production increase percentage calculated by the difference between the source-wide Baseline Period Production and the source-wide Projected Future Production of the facility. However, the PAE for the cracking furnaces above are equal to the PTE calculated using the new proposed 12-month rolling Firing Rates. The project emissions increase is as shown in the table below:

PSD Criteria Pollutant	CO	NO_X	SO_2	PM	PM_{10}	$PM_{2.5}$	VOC
Emissions Increase	14.78	17.02	0.29	9.02	9.02	9.02	4.95
PSD Significance Emissions Rate	100	40	40	25	15	10	40
Further PSD Review Needed.	No	No	No	No	No	No	No

Pursuant to 401 KAR 51:017, Section 16, to preclude 401 KAR 51:017 as related to the application received by the Division on October 18, 2022, the permittee shall monitor and calculate annual PM_{10} and $PM_{2.5}$ emissions from EPNs 305 – 307, EPN 311, and EPNs 327 - 328 and maintain a record of the annual emissions in tons per year on a calendar year basis for ten (10) years while the units are in operation. The source shall submit a report to the Division if:
(1) The annual PM_{10} or $PM_{2.5}$ emissions, in tons per year, from the proposed project exceeds the baseline actual emissions by a significant amount; and
(2) The PM_{10} or $PM_{2.5}$ emissions differ from the projected actual emissions as submitted in the application for the modification related to the proposed project.

APE20230002/APE20230003 (Minor Revision):

- The following changes to the permit are from previously permitted changes that started up at the facility:
  - Ethylene Flare EPN 321A was started on May 23, 2023. Therefore the existing flare (EPN 321) and temporary flare (EPN 321B); and their associated requirements have been removed from the permit.
  - The Dekoke Pot (EPN 326A) started up on December 11, 2021. Therefore the existing Dekoke Pot (EPN 326) and its associated requirements have been removed from the permit.
  - The Fuel Oil Tank (EPN 332BR) was started up on December 11, 2020.

- The following emission units have been updated to reflect changes made to 40 CFR 63, Subpart YY which were published on July 6, 2020 and effective on July 6, 2023:
  - Decoke Pot (EPN 326A)
  - n-Propanol Tank (EPN 318) (Subpart YY no longer applies, moved to Section C)
  - Gasoline Storage Tanks (EPN 319 and EPN 320)
  - Ethylene Flare (EPN 321A)
  - Equipment Leak Fugitives in MACT YY Service (EPN FUG-ETH-YY)
  - No. 4A Cooling Water Tower (EPN 364A)

- The following emission units have been added to the permit based on the changes made to 40 CFR 63, Subpart YY which were published on July 6, 2020 and effective on July 6, 2023:
  - EMACT Maintenance Vent Provisions (EPN 379)
  - Non-EMACT Equipment Openings (EPN 380) (Insignificant Activity)

- While no new equipment has been physically added to the facility per the changes above, the requirements from 40 CFR 63, Subpart YY have required the quantification of emissions from several existing emission units at the facility. The project emissions increase associated with the quantified emissions are shown in the table below:

PSD Criteria Pollutant	CO	NO_X	SO_2	PM	PM_{10}	$PM_{2.5}$	VOC
Emissions Increase	0.066	0.011	0.012	--	--	--	7.117
PSD Significance Emissions Rate	100	40	40	25	15	10	40
Further PSD Review Needed.	No	No	No	No	No	No	No

An addendum to the application received on June 28, 2023 (APE20230002) was received on July 17, 2023 (APE20230003) to show the difference between the confidential and non-confidential versions of the application. No other changes were made to the original application (APE20230002).

APE20230004 (Significant Revision):

- The Division received an application for a significant revision to incorporate requirements for the Ethylene Flare (EPN 321A) which are specified and required by the Consent Decree 2:22-cv-0157-JDC-KK. Only those requirements which are relevant to the Steam Assisted Ethylene Flare at Westlake Chemical OpCo LP have been incorporated into Section B of permit V-20-022 R2.

APE20230004 (Off Permit Change):

- The Division received an application for an Off-Permit Change on August 19, 2024 for the replacement of burners on the Dryer Regenerator Heater EPN 313. The new burners are the same as the existing burners so the PTE has not changed. Furthermore, the PTE for EPN 313 have been used to show that the project does not warrant further PSD analysis. The project emissions increase is as shown in the table below:

PSD Criteria Pollutant	CO	NO_X	SO_2	PM	PM_{10}	$PM_{2.5}$	VOC
Emissions Increase	0.79	0.95	0.00	0.04	0.04	0.04	0.05
PSD Significance Emissions Rate	100	40	40	25	15	10	40
Further PSD Review Needed.	No	No	No	No	No	No	No

Updated Netting Analysis for NO_X

Westlake opted to calculate increases and decreases in actual emissions for NO_X, in order to show that the net emissions increase for NOx from the PSD 2020 Expansion Project was not considered a significant increase to trigger further analysis under PSD. The updated NOx Netting Analysis Summary for Westlake Chemical OpCo LP, Westlake Vinyls, Inc. – Vinyls Plant, and Westlake Vinyls, Inc. – PVC Plant as of October 2022 (based on all applications received by the Division) is shown below.

Facility	Contemporaneous Emission (tpy)
Westlake Vinyls, Inc. – Vinyls Plant	-188.78
Westlake Chemical OpCo LP	12.29
Westlake Vinyls, Inc. – PVC Plant	0.65
Total from project emissions increase	152.16
Total Contemporaneous Increases/Decreases	-175.84
Total net emissions increase	-23.68

V-20-022 R2 Emission Summary				
Pollutant	2023 Actual (tpy)	Previous PTE V-20-022 R1 (tpy)	Change (tpy)	Renewal PTE V-20-022 R2 (tpy)
CO	170.01	388.28	-30.58	357.70
NO_X	151.47	213.54	3.74	217.28
PT	30.09	49.00	3.07	52.07
PM_{10}	30.05	48.69	3.07	51.76
$PM_{2.5}$	29.07	40.76	3.06	43.82
SO_2	3.77	2.31	0.13	2.44
VOC	111.44	205.09	-0.07	205.02
Lead	--	0	0	0
Greenhouse Gases (GHGs)				
Carbon Dioxide	766,015	1,014,274	57,967	1,072,241
Methane	50.01	92.86	-4.72	88.14
Nitrous Oxide	0.597	1.64	0.07	1.71
CO_2 Equivalent (CO_2e)	767,574	1,017,084	57,869	1,074,953
Hazardous Air Pollutants (HAPs) and Toxic Air Pollutants (TAPs)				
1,3-Butadiene	4.456	5.16	-2.145	3.015
*Ammonia (anhydrous)	--	9.001	0.00	9.001
Benzene	13.508	23.51	-6.382	17.128
Toluene	0.434	3.24	0.00	3.238
Xylenes (Total)	0.012	2.01	0.00	2.01
Combined HAPs:	18.413	33.94	-8.522	25.418

*Pursuant to 401 KAR 63:060, Section 2, Ammonia is not in the list of Hazardous air pollutants, and is not included in the Combined HAPs shown above.

SECTION 3 – EMISSIONS, LIMITATIONS AND BASIS

Emission Unit 005A-C (EPN 305-307) Cracking Furnaces #1, #2 and #3				
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis**	**Compliance Method**
SO_2	0.8 lb/mmBtu	401 KAR 59:015, Section 5(1)(b)	0.6 lb/mmscf, AP-42 Section 1.4	Burning Process Fuel Gas
PM	0.1 lb/mmBtu	401 KAR 59:015, Section 4(1)(b)	0.01 lb/mmBtu, Manufacturer's Guarantee	
	20% Opacity	401 KAR 59:015. Section 4(2)(c)	N/A	

Initial Construction and Modification Date: 1963, Modified in 2013, March 2020

Process Description:
EU# 005A-C (EPN 305-307) Three (3) Cracking Furnaces (#1, #2 and #3)
Rating: 170 mmBtu/hr each
Primary Fuel: Process fuel gas *
Control Device: Low NOx burners (LNB)
* Process fuel gas (PFG) includes natural gas, ethylene plant fuel gas, hydrogen, propane, ethane, recovered flare gas and mixtures thereof.

Applicable Regulation:
401 KAR 59:015, New Indirect Heat Exchangers.

401 KAR 60:002, Section 2(2)(ttt), 40 C.F.R. 60.700 through 60.708 (Subpart RRR), Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes.

401 KAR 63:002, Section 2(4)(oo), 40 C.F.R. 63.1100 through 63.1114 (Subpart YY), National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards.

Comments:
Emissions of PM, CO and NO_X are based on manufacturer's guarantee, VOC and SO_2 are based on AP-42, Section 1.4 emission factors, and converting based on process gas heating value of 448 Btu/scf. Greenhouse gases are calculated based on 40 CFR 98, Subpart C.

Per the PSD 2020 Expansion Project, the furnaces shall not exceed the hourly firing rates of 184 mmBtu/hr each on a 24-hour average, and 150 mmBtu/hr each on a 12-month rolling basis. Records shall be maintained of the hourly consumption of fuel on a pound per hour basis, as well as the hourly heat content of the fuel gas used and its density. Records shall be maintained of the monthly and 12-month rolling average firing rate, based on the monthly consumption of fuel, as well as the monthly average heat content of the fuel gas and its density. Per the Description of Action for APE20220007 (Minor Revision) in **Section 2** above, the furnaces shall not exceed the hourly firing rates of 190 mmBtu/hr each on a 24-hour average, and 170 mmBtu/hr each on a 12-month rolling basis.

Decoking operation standards for ethylene cracking furnaces have been added to the permit, based on the updates to 40 CFR 63, Subpart YY as finalized in the Federal Register on July 6, 2020 and effective on July 6, 2023.

Emission Unit 005D (EPN 311) Cracking Furnace #7				
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis**	**Compliance Method**
SO_2	0.8 lb/mmBtu	401 KAR 59:015, Section 5(1)(b)	0.6 lb/mmscf, AP-42 Section 1.4	Burning Process Fuel Gas
PM	0.1 lb/mmBtu	401 KAR 59:015, Section 4(1)(b)	0.01 lb/mmBtu, Manufacturer's Guarantee	
	20% Opacity	401 KAR 59:015. Section 4(2)(c)	N/A	

Initial Construction and Modification Date: 1967, Modified in 2014, March 2020

Process Description:

EU# 005D (EPN 311)	**One (1) Cracking Furnace (#7)**
Rating:	90 mmBtu/hr
Fuel:	Process fuel gas*
Control Device:	Low NOx burners (LNB)

* Process fuel gas (PFG) includes natural gas, ethylene plant fuel gas, hydrogen, propane, ethane, recovered flare gas and mixtures thereof.

Applicable Regulation:
401 KAR 59:015, New Indirect Heat Exchangers.

401 KAR 60:002, Section 2(2)(ttt), 40 C.F.R. 60.700 through 60.708 (Subpart RRR), Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes.

401 KAR 63:002, Section 2(4)(oo), 40 C.F.R. 63.1100 through 63.1114 (Subpart YY), National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards.

Comments:
Emissions of PM, CO and NO_X are based on manufacturer's guarantee, VOC and SO_2 are based on AP-42, Section 1.4 emission factors, and converting based on process gas heating value of 448 Btu/scf. Greenhouse gases are calculated based on 40 CFR 98, Subpart C.

Per the PSD 2020 Expansion Project, the furnace shall not exceed the hourly firing rate of 105 mmBtu/hr on a 24-hour average, and 80 mmBtu/hr on a 12-month rolling basis. Records shall be maintained of the hourly consumption of fuel on a pound per hour basis, as well as the hourly heat content of the fuel gas used and its density. Records shall be maintained of the monthly and 12-month rolling average firing rate, based on the monthly consumption of fuel, as well as the monthly average heat content of the fuel gas and its density. Per the Description of Action for APE20220007 (Minor Revision) in **Section 2** above, the furnace shall not exceed the hourly firing rate of 105 mmBtu/hr on a 24-hour average, and 90 mmBtu/hr on a 12-month rolling basis.

Decoking operation standards for ethylene cracking furnaces have been added to the permit, based on the updates to 40 CFR 63, Subpart YY as finalized in the Federal Register on July 6, 2020 and effective on July 6, 2023.

Emission Unit 006A-B (EPN 327-328) Cracking Furnaces #8 and #9				
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis**	**Compliance Method**
SO_2	0.8 lb/mmBtu	401 KAR 59:015, Section 5(1)(b)	0.6 lb/mmscf, AP-42 Section 1.4	Burning Process Fuel Gas
PM	0.1 lb/mmBtu	401 KAR 59:015, Section 4(1)(b)	0.01 lb/mmBtu, Manufacturer's Guarantee	
	20% Opacity	401 KAR 59:015, Section 4(2)(c)	N/A	

Initial Construction and Modification Date: 1976, Modified in 2014

Process Description:
EU# 006A–B (EPN 327-328) Two (2) Cracking Furnaces (#8 and #9)
Rating: 127 mmBtu/hr each
Fuel: Process fuel gas*
Control Device: Low NOx burners (LNB)
* Process fuel gas (PFG) includes natural gas, ethylene plant fuel gas, hydrogen, propane, ethane, recovered flare gas and mixtures thereof.

Applicable Regulation:
401 KAR 59:015, New Indirect Heat Exchangers.

401 KAR 60:002, Section 2(2)(ttt), 40 C.F.R. 60.700 through 60.708 (Subpart RRR), Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes.

401 KAR 63:002, Section 2(4)(oo), 40 C.F.R. 63.1100 through 63.1114 (Subpart YY), National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards.

Comments:
Emissions of PM, CO, NO_X and VOC are based on manufacturer's guarantee, SO_2 is based on AP-42, Section 1.4 emission factors, and converting based on process gas heating value of 448 Btu/scf. Greenhouse gases are calculated based on 40 CFR 98, Subpart C.

The furnaces shall not exceed the hourly firing rates of 135 mmBtu/hr each on a 24-hour average, and 127 mmBtu/hr each on a 12-month rolling basis. Records shall be maintained of the hourly consumption of fuel on a pound per hour basis, as well as the hourly heat content of the fuel gas used and its density. Records shall be maintained of the monthly and 12-month rolling average firing rate, based on the monthly consumption of fuel, as well as the monthly average heat content of the fuel gas and its density. See the Description of Action for APE20220007 (Minor Revision) in **Section 2** above. These units saw actual emissions increases due to the APC System, but no change in PTE.

Decoking operation standards for ethylene cracking furnaces have been added to the permit, based on the updates to 40 CFR 63, Subpart YY as finalized in the Federal Register on July 6, 2020 and effective on July 6, 2023.

Emission Unit 006C (EPN 329) Cracking Furnace #10				
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis**	**Compliance Method**
SO_2	0.8 lb/mmBtu	401 KAR 59:015, Section 5(1)(b)	0.6 lb/mmscf, AP-42 Section 1.4	Burning Process Fuel Gas
PM	0.1 lb/mmBtu	401 KAR 59:015, Section 4(1)(b)	0.007 lb/mmBtu, BACT limit	
	20% Opacity	401 KAR 59:015. Section 4(2)(c)	N/A	
$PM/PM_{10}/PM_{2.5}$	0.007 lb/mmBtu	401 KAR 51:017, Section 8	0.007 lb/mmBtu, BACT limit	Initial performance testing and Good combustion practices
CO	0.013 lb/mmBtu		0.013 lb/mmBtu, Manufacturer's guarantee	
VOC	0.005 lb/mmBtu		0.005 lb/mmBtu, Manufacturer's guarantee	Good combustion practices
CO_2e	30,775 tpy		46 lb CO_2/mmBtu, 40 CFR 98.33(a)(3)(iii), and 0.006 lb CH_4/mmBtu and 0.001 lb N_2O/mmBtu, 40 CFR 98, Subpart C Table 2 for fuel gas	

Initial Construction Date: Proposed 2025

Process Description:

EU# 006C (EPN 329)	**One (1) Cracking Furnace (#10)**
Rating:	150 mmBtu/hr
Fuel:	Process fuel gas *
Control Devices:	Low NOx burners (LNB) and Selective Catalytic Reduction (SCR)

* Process fuel gas (PFG) includes natural gas, ethylene plant fuel gas, hydrogen, propane, ethane, recovered flare gas and mixtures thereof.

Applicable Regulation:

401 KAR 51:017, Prevention of Significant Deterioration of Air Quality. (For CO, PM, PM_{10}, $PM_{2.5}$, VOC and CO_2e.)

401 KAR 59:015, New Indirect Heat Exchangers.

401 KAR 60:002, Section 2(2)(ttt), 40 C.F.R. 60.700 through 60.708 (Subpart RRR), Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes.

401 KAR 63:002, Section 2(4)(oo), 40 C.F.R. 63.1100 through 63.1114 (Subpart YY), National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards.

Emission Unit 006C (EPN 329) Cracking Furnace #10
Comments: Emissions of NO_X, CO, VOC, PM and Ammonia are based on manufacturer's guarantee, SO_2 is based on AP-42, Section 1.4 emission factors and converting based on process gas heating value of 448 Btu/scf. Greenhouse gases are calculated based on 40 CFR 98, Subpart C. The furnace shall not exceed the hourly firing rate of 184 mmBtu/hr on a 24-hour average, and 150 mmBtu/hr on a 12-month rolling basis. Records shall be maintained of the hourly consumption of fuel on a pound per hour basis, as well as the hourly heat content of the fuel gas used and its density. Records shall be maintained of the monthly and 12-month rolling average firing rate, based on the monthly consumption of fuel, as well as the monthly average heat content of the fuel gas and its density. This Furnace was permitted before the APC System was implemented by the 502(b)(10) Change and Minor Application received by the Division on March 10, 2020 and October 18, 2022, respectively. However, the implementation of APC System did not include Furnace #10 as it had not been constructed yet. Decoking operations standards for ethylene cracking furnaces have been added to the permit, based on the updates to 40 CFR 63, Subpart YY as finalized in the Federal Register on July 6, 2020. Upon startup, this cracking furnace is required to inspect the coking isolation valves, conduct daily inspections of the firebox burners, continuously monitor CO_2 emissions of the decoke effluent, and monitor the temperature of the radiant tubes during decoking.

Emission Unit (326A), Ethylene Decoking Pot				
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis**	**Compliance Method**
PM	14.56 lb/hr	401 KAR 59:010, Section 3(2)	11.72 lb/hr (12 hr decoke cycle), Design specs and engineering Estimate	Assumed compliance while operating control device.
	20% Opacity	401 KAR 51:017, Section 8	NA	Method 9 testing
	6.15 lb/hr (24-hr avg), 4.53 tpy (12-month rolling)	401 KAR 52:020, Section 10	11.72 lb/hr (12 hr decoke cycle), Design specs and engineering Estimate	Operate and maintain control device in accordance with manufacturer's recommendations
PM_{10}	6.04 lb/hr (24-hr avg), 4.53 tpy (12-month rolling)		11.72 lb/hr (12 hr decoke cycle), Design specs and engineering Estimate	
$PM_{2.5}$	2.40 lb/hr (24-hr avg), 1.79 tpy (12-month rolling)		1.84 lb/hr (12 hr decoke cycle), Design specs and engineering Estimate	
CO	197.67 lb/hr (24-hr avg), 148.25 tpy (12-month rolling)		197.73 lb/hr (12 hr decoke cycle), Design specs and engineering Estimate	Initial testing, and every 5 years

Emission Unit (326A), Ethylene Decoking Pot				
CO_2e	932 tpy (12-month rolling)	401 KAR 51:017, Section 8	1242.85 lb/hr (12 hr decoke cycle), Design specs and engineering Estimate	Initial testing, and every 5 years, maintain furnace as outlined in GCOPP (see comments)

*Process weight rate for the decoking operation includes steam weight.

Initial Construction Date: December 2021

Process Description:
(EPN 326A) Ethylene Decoking Pot
Decoking is the process of gasifying the coke with steam and air to remove it from the radiant coils and TLEs from the cracking furnaces. When a furnace is shut down to decoke, the feed is shut off, the target temperature of the furnace is minimally reduced, the furnace is put on hot steam standby. The furnace is physically isolated from the process and hard-piped to the decoking pot. Due to the piping connection, 100% capture of the emissions is assumed. During the decoking operation, the steam and air react with the coke in the furnace tubes at high temperatures to clean the tubes and the exhaust is routed through the decoke pot for PM control. When the decoke cycle is complete, the furnace is disconnected from the decoke pot, reconnected to the process, and put on hot steam standby again prior to having feed introduced. Each 24-hour decoke operation takes approximately to 48 hours to complete.

Control: Integrated Cyclone and scrubber

Applicable Regulation:
401 KAR 51:017, Prevention of Significant Deterioration of Air Quality. (For PM, PM_{10}, $PM_{2.5}$, CO and CO_2e).

401 KAR 59:010, New process operations.

Comments:
Two (2) engineering documents, one from Technip, and one from Peco Facet, are used to estimate PM, PM_{10}, and $PM_{2.5}$ from the decoking operations, and stoichiometry to estimate CO and CO_2 emissions. PM calculation methodology assumes all coke is emitted as particulate matter (none is converted to CO or CO_2) and the CO/CO_2 calculation methodology assumes all coke is converted to CO or CO_2 (no PM is emitted) and, therefore, is conservative.

Work practice standards have been updated in the cracking furnaces that require monitoring of the decoke effluent during use.

The decoking operations shall not exceed 1,500 hours per year.

A good combustion and operation practices plan (GCOPP) shall be developed that defines, measures and verifies the use of operational practices for minimizing CO_2e emissions. The plan shall be incorporated into the plant standard operating procedures (SOP) and shall be made available for the Division's inspection. Pursuant to 401 KAR 52:020, Section 10, the permittee shall implement a startup, shutdown and malfunction plan as defined in 40 CFR 63, Subpart YY as published in 86 FR 66126, Nov. 19, 2021, during decoking operations, which shall be made available for Division review.

Emission Unit DRH (EPN 313) and RRH (EPN 314), Dryer and Reactor Regeneration Heater				
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis**	**Compliance Method**
RRH SO_2	0.8 lb/mmBtu	401 KAR 59:015, Section 5(1)(b)	0.6 lb/mmscf, AP-42 Section 1.4	Burning Process Fuel Gas
DRH SO_2	0.33 lb/mmBtu	401 KAR 61:015, Section 5		
RRH PM	0.1 lb/mmBtu	401 KAR 59:015, Section 4(1)(b)	7.6 lb/mmscf, AP-42 Section 1.4	Burning Process Fuel Gas
	20% Opacity	401 KAR 59:015. Section 4(2)(c)	N/A	
DRH PM	0.16 lb/mmBtu	401 KAR 61:015, Section 4	7.6 lb/mmscf, AP-42 Section 1.4	
	20% Opacity	401 KAR 61:015, Section 4(b)	N/A	

Initial Construction Date: DRH – 1963, RRH - 2005

Process Description:

EU# DRH (EPN 313) **Dryer Regeneration Heater**
Rating: 8.19 mmBtu/hr
Primary Fuel: Process fuel gas*
Control Device: None

EU# RRH (EPN 314) **Reactor Regeneration Heater**
Rating: 5.28 mmBtu/hr
Primary Fuel: Process fuel gas*
Control Device: None

* Process fuel gas (PFG) includes natural gas, ethylene plant fuel gas, hydrogen, propane, ethane, recovered flare gas and mixtures thereof.

Applicable Regulation:

401 KAR 59:015, New Indirect Heat Exchangers. EU RRH (EPN 314)

401 KAR 60:002, Section 2(2)(ppp), 40 C.F.R. 60.660 through 60.668 (Subpart NNN), Standards of Performance for Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations.

401 KAR 60:002, Section 2(2)(ttt), 40 C.F.R. 60.700 through 60.708 (Subpart RRR), Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes.

401 KAR 61:015, Existing Indirect Heat Exchangers. EU DRH (EPN 313)

401 KAR 63:002, Section 2(4)(iiii), 40 C.F.R. 63.7480 through 63.7575, Tables 1 through 13 (Subpart DDDDD), National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters.

Emission Unit DRH (EPN 313) and RRH (EPN 314), Dryer and Reactor Regeneration Heater

Comments:
All emission calculations are based on AP-42, Section 1.4 emission factors, correcting for the process gas heating value of 448 Btu/scf. Greenhouse gases are calculated based on 40 CFR 98, Subpart C.

Pursuant to 40 CFR 60.660(d) and 60.700(d), if the permittee chooses to comply with the requirements in 40 CFR 65, Subpart D, 40 CFR 65.149(b)(2)(ii) exempts boilers and process heaters where the vent stream is introduced with or as the primary fuel from performance tests and monitoring.
The Energy Assessment for EU DRH (EPN 313) and RRH (EPN 314) as required by Item 4 of Table 3 to 40 CFR 63, Subpart DDDDD was conducted on November 12, 2015.

The RRH shall not exceed the hourly firing rate of 5.90 mmBtu/hr on a 24-hour average, and 5.28 mmBtu/hr on a 12-month rolling basis. Records shall be maintained of the hourly consumption of fuel on a pound per hour basis, as well as the hourly heat content of the fuel gas used and its density. Records shall be maintained of the monthly and 12-month rolling average firing rate, based on the monthly consumption of fuel, as well as the monthly average heat content of the fuel gas and its density.

Emission Unit 021 (EPN 318), n-Propanol Tank (TK-932)

Initial Construction Date: 1963

Process Description:

EU# 021 (EPN 318)	**n-Propanol Tank (TK-932)**
Type of Tank:	Fixed Roof
Maximum Capacity:	3,000 gallons (11.36 m^3)

Maximum true vapor pressure of total organic HAP: 5.13 kilopascals (kPa) (0.7434 psia)

Applicable Regulation:
None

Comments:
VOC emissions are calculated using the equations from AP-42 Chapter 7, updated June 2020.

Pursuant to changes made to 40 CFR 63, Subpart YY which were published on July 6, 2020 and effective on July 6, 2023, 40 CFR 63. Subpart YY is no longer applicable to EPN 318. Therefore, Emission Unit 021 (EPN 318) has been moved to Section C of permit V-20-022 R2 as an insignificant activity.

Emission Unit 332 (EPN 332BR), Fuel Oil Storage Tanks

Initial Construction Date: 332BR – August 2020

Process Description:

(EPN 332BR)	**Fuel Oil Storage Tank**
Type of Tank:	Fixed Roof
Maximum Capacity:	96,000 gallons capacity

True vapor pressure of organic HAP < 3.4kPa

Emission Unit 332 (EPN 332BR), Fuel Oil Storage Tanks

Applicable Regulation:
401 KAR 63:002, Section 2(4)(oo), 40 C.F.R. 63.1100 through 63.1114 (Subpart YY), National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards.

Comments:
VOC emissions are calculated using the equations from AP-42 Chapter 7, updated June 2020.

APE20200002 requested the removal of 332A and 332B and installation of 332C and 332D as part of emission unit 332. APE20200004 requested the addition of Tank 332BR. APE20220003 (Administrative Amendment) removed 332C and 332D from the permit.

Emission Unit 022 (EPN 319 and EPN 320), Gasoline Storage Tanks (TK 904A and TK 904B)

Initial Construction Date: 1963

Process Description:

EU# 022 (EPN 319)	**Gasoline Storage Tank (TK 904A)**
Type of Tank:	Internal Floating Roof
Maximum Capacity:	259,308 gallon capacity
Maximum true vapor pressure:	12.13 kilopascal

EU# 022 (EPN 320)	**Gasoline Storage Tank (TK 904B)**
Type of Tank:	Internal Floating Roof
Maximum Capacity:	259,308 gallon capacity
Maximum true vapor pressure:	12.13 kilopascal

Applicable Regulation:
401 KAR 63:002, Section 2(4)(mm), 40 C.F.R. 63.1060 through 63.1067 (Subpart WW), National Emission Standards for Storage Vessels (Tanks).

401 KAR 63:002, Section 2(4)(oo), 40 C.F.R. 63.1100 through 63.1114 (Subpart YY), National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards.

Comments:
VOC emissions are calculated using the equations from AP-42 Chapter 7, updated June 2020.

Visual inspections of the floating roof deck, deck fittings and rim seals shall be performed at least once per year, and each time the storage vessel is completely emptied and degassed, or every 10 years. If the IFR has two rim seals, the inspection may be only every time the vessel is emptied and degassed or every 5 years.

Emission Unit #007A (EPN 321A), Ethylene Flare				
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis**	**Compliance Method**
PM	20% Opacity	401 KAR 63:015, Section 3	N/A	Operate in compliance with 40 CFR 60.18(c) through (f)

Initial Construction Date: May 2023

Process Description:

EU# 007A (EPN 321A)	**Ethylene Flare**
Type:	John Zink, continuously operated, steam assisted
Auxiliary Fuel:	Process Fuel Gas and/or Natural Gas
Maximum Rating:	5,979 mmBtu/hr

Description: The Ethylene Plant flare is used to burn hydrocarbon streams from the Ethylene plant and the contiguous Cymetech plant. The flare routinely burns excess plant process gas, tank car, barge, and tank truck loading/unloading venting and hose purges, transfer line purges, and vents from various tanks in the plant. It also burns relief valve venting and equipment venting during maintenance/ emergency shutdowns of the Ethylene plant.

Applicable Regulation:

401 KAR 51:017, Prevention of Significant Deterioration of Air Quality. (For CO, PM, PM_{10}, $PM_{2.5}$, VOC and CO_2e)

401 KAR 60:002, Section 2(2)(ppp), 40 C.F.R. 60.660 through 60.668 (Subpart NNN), Standards of Performance for Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations.

401 KAR 60:002, Section 2(2)(ttt), 40 C.F.R. 60.700 through 60.708 (Subpart RRR), Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes.

401 KAR 63:002, Section 2(1), 40 C.F.R. 63.1 through 63.16, Table 1 (Subpart A), General Provisions.

401 KAR 63:002, Section 2(4)(t), 40 C.F.R. 63.640 through 63.679 (Subpart CC), National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries. (As referenced by Subpart YY)

401 KAR 63:002, Section 2(4)(ii), 40 C.F.R. 63.980 through 63.999 (Subpart SS), National Emission Standards for Closed Vent Systems, Control Devices, Recovery Devices and Routing to a Fuel Gas System or a Process. (As referenced by Subpart YY)

401 KAR 63:002, Section 2(4)(oo), 40 C.F.R. 63.1100 through 63.1114 (Subpart YY), National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards.

401 KAR 63:015, Flares.

Emission Unit #007A (EPN 321A), Ethylene Flare

Comments:
Emissions are calculated using AP-42 Table 13.5-1 for CO and NO_X. GHG's are calculated from 40 CFR 98, Subpart X. VOC is calculated using Material Balance. All other HAPs are calculated using natural gas combustion emission factors from AP-42 Chapter 1.4.

The permittee must operate in compliance with 40 CFR 60.18 and 40 CFR 63.11, follow good engineering practices and minimize the vent gas, and develop a startup and shutdown procedure for each process that vents to the flare.

The permittee shall prepare and maintain for EU# 007A (EPN 321A), within 60 days of startup, a good combustion and operation practices plan (GCOPP) that defines, measures and verifies the use of operational and design practices determined as BACT for minimizing CO, VOC and GHG (as CO_2e) emissions which shall be submitted to the Division for review. The permittee shall operate according to the provisions of this plan at all times, including periods of startup, shutdown, and malfunction. The plan shall be incorporated into the plant standard operating procedures (SOP) and shall be made available for the Division's inspection.

Updates to the standards for the ethylene flare have been made to the permit, based on the changes in 40 CFR 63, Subpart YY as finalized in the Federal Register July 6, 2020.

Pursuant to 40 CFR 63.1103(e)(4), upon startup of EU#007A, the permittee must meet the applicable requirements for flares as specified in 40 CFR 63, Subpart CC [40 CFR 63.670 and 40 CFR 63.671].

Requirements applicable to the Steam Assisted Ethylene Flare (EPN 321A) at Westlake Chemical OpCo LP have been incorporated into permit V-20-022 R2 as specified and required by Consent Decree 2:22-cv-0157-JDC-KK. The requirements are included under **1. Operating Limitations**, **4. Specific Monitoring Requirements**, **5. Specific Recordkeeping Requirements**, and **6. Specific Reporting Requirements**.

Pursuant to **1. Operating Limitations** bb.(5), everything in Appendix 1.1 has been implemented so there are not "any practices that the permit requires the permittee to implement after October 26, 2022 for the period between October 26, 2022 and the compliance requirements.

Emission Unit #025 (EPN FUG-ETH-YY), Ethylene Plant Fugitives Subject to 40 CFR 63, Subpart YY

Initial Construction Date: October 2012

Process Description:
EU# 025 (EPN FUG-ETH-YY) Ethylene Plant Fugitives Subject to 40 CFR 63, Subpart YY
The following is an approximate count of the total existing pipeline equipment at the ethylene plant subject to 40 CFR 63, Subpart YY. The pipeline equipment at the emission point listed above is included in this total.

Gas/Flanges:	7,304	Gas/Vapor Valves:	1,203
Pumps:	30	Compressors:	2
Light Liquid Flange:	8,315	Light Liquid Valves:	1,368
*Gas/Flanges:	273	*Light Liquid Flanges:	725

*Flanges are existing and insulated. Flanges are unable to be monitored, thus have no control associated with emissions.

Emission Unit #025 (EPN FUG-ETH-YY), Ethylene Plant Fugitives Subject to 40 CFR 63, Subpart YY

Ethylene Plant Fugitives Subject to 40 CFR 63, Subpart YY and 401 KAR 51:017 from 2020 Expansion Project

The following pipeline equipment are from the 2020 Expansion Project and are subject to 401 KAR 51:017. The pipeline equipment count listed below reflects an accurate count of the equipment as of the date of issuance of permit V-14-022 R2 and reflects the number of each type of equipment subject to BACT pursuant to 401 KAR 51:017, Section 8.

Gas/Flanges:	139	Gas/Vapor Valves:	21
Light Liquid Flange:	179	Light Liquid Valves:	27

NOTE - The pipeline equipment count listed above reflects an accurate count of the equipment as of the date of issuance of this permit but is not intended to limit the permittee to the exact numbers specified. The permittee may add or remove pipeline equipment without a permit revision as long as the equipment continues to comply with the applicable requirements listed below, and the changes do not cause a significant increase of emissions or potential to emit.

Applicable Regulation:

401 KAR 51:017, Prevention of Significant Deterioration of Air Quality [VOC and CO_2e]

401 KAR 57:002, Section 1(2), 40 CFR 61, Subpart J, National emission standard for equipment leaks (fugitive emission sources) of benzene.

401 KAR 63:002, Section 2(4)(kk) 40 C.F.R. 63.1019 through 63.1039, Table 1 (Subpart UU), National Emission Standards for Equipment Leaks - Control Level 2 Standards.

401 KAR 63:002, Section 2(4)(oo), 40 C.F.R. 63.1100 through 63.1114 (Subpart YY), National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards.

Comments:

Fugitive emissions are calculated using emission factors from EPA 453/R-95-017 Table 2-1, along with mass balance to calculate the total VOC, individual HAPs and methane. Control efficiencies associated with different monitoring programs are used as appropriate.

Pursuant to 401 KAR 51:017, Section 8, the following control technology, equipment and method are required to meet BACT demonstration for VOC emissions:

(1) The permittee shall keep records of the count of fugitive components added which are subject to 401 KAR 51:017 and identify and label them as subject to 401 KAR 51:017 using the procedures of 40 CFR 63, Subpart UU.

(2) For units subject to 40 CFR 63, Subpart UU, the permittee shall comply with the requirements from 40 CFR 63, Subpart UU (LDAR) and in accordance with **Compliance Demonstration Method** (1) to **1. Operating Limitations** for emission unit 025 (EPN FUG-ETH-YY) in the permit for a leak as defined as a reading of 500 ppmv.

Emission Unit #025 (EPN FUG-ETH-YY), Ethylene Plant Fugitives Subject to 40 CFR 63, Subpart YY

Pursuant to 401 KAR 51:017, Section 8, the following control technology, equipment and method are required to meet BACT demonstration for Greenhouse Gases (as CO_2e) emissions:

(1) The permittee shall keep records of the count of fugitive components added which are subject to 401 KAR 51:017 and identify them as subject to 401 KAR 51:017 using the procedures of 40 CFR 63, Subpart UU.
(2) For units subject to 40 CFR 63, Subpart UU, the permittee shall implement the requirements from 40 CFR 63, Subpart UU (LDAR) and in accordance with **Compliance Demonstration Method** (2) to **1. Operating Limitations** for emission unit 025 (EPN FUG-ETH-YY) in the permit for a leak as defined as a reading of 500 ppmv.

Pursuant to 401 KAR 52:020, Section 10, the permittee shall use the following control efficiencies while calculating potential emissions from each fugitive component:

(1) 97% for valves in gas/vapor and light liquid service;
(2) 0% for valves in heavy liquid service;
(3) 85% for pumps in light liquid service;
(4) 0% for pumps in heavy liquid service;
(5) 75% for connectors in gas/vapor and light liquid service;
(6) 85% for all compressors; and
(7) 97% for relief valves in gas/vapor service.

Updates to the standards for the pressure relief valves have been made to the permit, based on the changes in 40 CFR 63, Subpart YY as finalized in the Federal Register on July 6, 2020.

Pursuant to 40 CFR 63.1103(e)(3) and Table 7, item (f)(1)(ii) of 40 CFR 63, Subpart YY, the PRV's shall follow the requirements as listed in 40 CFR 63.1107(h) and 40 CFR 63.1103(e)(9).

Emission Unit #025A (EPN FUG-ETH-VVa) and #025B (EPN FUG-ETH), Ethylene Plant Fugitives Subject to 40 CFR 60, Subpart VVa and Ethylene Plant Fugitives not in LDAR Program

Initial Construction Date: 025A – October 2012, 025B - 1993

Process Description:

EU# 025A (EPN FUG-ETH-VVa) Ethylene Plant Fugitives Subject to 40 CFR 60, Subpart VVa*

The following is an approximate count of the total pipeline equipment at the ethylene plant subject to 40 CFR 60, Subpart VVa.

Gas Connectors:	29,408	Gas/Vapor Valves:	7,426
Pumps:	29	Compressors:	14
Light Liquid Valves:	872	Light Liquid Connectors:	2,500
		Pressure Relief Valves:	135

EU# 025A (EPN FUG-ETH-VVa) Ethylene Plant Fugitives Subject to 40 CFR 60, Subpart VVa and 401 KAR 51:017*

The following pipeline equipment are from the 2020 Expansion Project and are subject to 401 KAR 51:017 and 40 CFR 60, Subpart VVa. The pipeline equipment count listed below reflects an accurate count of the equipment as of the date of issuance of permit V-14-022 R2 and reflects the number of each type of

Emission Unit #025A (EPN FUG-ETH-VVa) and #025B (EPN FUG-ETH), Ethylene Plant Fugitives Subject to 40 CFR 60, Subpart VVa and Ethylene Plant Fugitives not in LDAR Program

equipment subject to BACT pursuant to 401 KAR 51:017, Section 8 for VOC and CO_2e.

Gas Connectors:	1,471	Gas/Vapor Valves:	372
Pumps:	0	Compressors:	0
Light Liquid Valves:	44	Light Liquid Connectors:	125
		Pressure Relief Valves:	7

*There are no batch processes in this facility

EU# 025B (EPN FUG-ETH) Ethylene Plant Fugitives not in LDAR Program
The following is an approximate count of the total pipeline equipment at the ethylene plant not subject to 40 CFR 60 Subpart VVa or 40 CFR 63, Subpart YY. The equipment listed as not in LDAR program has no requirements.

Flanges/connectors:	763	Gas/Vapor Valves:	213

EU# 025B (EPN FUG-ETH) Ethylene Plant Fugitives not in LDAR Program and subject to 401 KAR 51:017
The following pipeline equipment are from the 2020 Expansion Project and are not subject to 40 CFR 60, Subpart VVa or 40 CFR 63, Subpart YY. The pipeline equipment count listed below reflects an accurate count of the equipment as of the date of issuance of permit V-14-022 R2 and reflects the number of each type of equipment subject to BACT pursuant to 401 KAR 51:017, Section 8 for VOC and CO_2e.

Flanges/connectors:	382	Gas/Vapor Valves:	107

NOTE - The pipeline equipment count listed above reflects an accurate count of the equipment as of the date of issuance of this permit but is not intended to limit the permittee to the exact numbers specified. The permittee may add or remove pipeline equipment without a permit revision as long as the equipment continues to comply with the applicable requirements listed below, and the changes do not cause a significant increase of emissions or potential to emit.

Applicable Regulation:
401 KAR 51:017, Prevention of Significant Deterioration of Air Quality [VOC and CO_2e]

401 KAR 60:002, Section 2(2)(ccc), 40 C.F.R. 60.480a through 60.489a (Subpart VVa), Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006. [EU# 025A (EPN FUG-ETH-VVa) only]

State Origin Requirements:
401 KAR 63:020, Potentially hazardous matter or toxic substances

Comments:
Fugitive emissions are calculated using emission factors from EPA 453/R-95-017 Table 2-1, along with mass balance to calculate the total VOC, individual HAPs and methane. Control efficiencies associated

Emission Unit #025A (EPN FUG-ETH-VVa) and #025B (EPN FUG-ETH), Ethylene Plant Fugitives Subject to 40 CFR 60, Subpart VVa and Ethylene Plant Fugitives not in LDAR Program

with different monitoring programs are used as appropriate.

Pursuant to 401 KAR 51:017, Section 8, the following control technology, equipment and method are required to meet BACT demonstration for VOC emissions:

(1) The permittee shall keep records of the count of fugitive components added which are subject to 401 KAR 51:017 and identify and label them as subject to 401 KAR 51:017 using the procedures of 40 CFR 60, Subpart VVa.
(2) For units subject to 40 CFR 60, Subpart VVa, the permittee shall comply with the requirements from 40 CFR 60, Subpart VVa (LDAR) and in accordance with **Compliance Demonstration Method** (1) to **1. Operating Limitations** for emission units 025A and 025B (EPN FUG-ETH-VVa and EPN FUG-ETH) in permit for a leak as defined as a reading of 500 ppmv.
(3) For units not subject to 40 CFR 60, Subpart VVa, but subject to 401 KAR 51:017, the permittee shall comply with the requirements of 40 CFR 60, Subpart VVa and in accordance with **Compliance Demonstration Method** (1) to **1. Operating Limitations** for emission units 025A and 025B (EPN FUG-ETH-VVa and EPN FUG-ETH) in permit for a leak as defined as a reading of 500 ppmv.

Pursuant to 401 KAR 51:017, Section 8, the following control technology, equipment and method are required to meet BACT demonstration for Greenhouse Gases (as CO_2e) emissions:

(1) The permittee shall keep records of the count of fugitive components added which are subject to 401 KAR 51:017 and identify them as subject to 401 KAR 51:017 using the procedures of 40 CFR 60, Subpart VVa.
(2) For units subject to 40 CFR 60, Subpart VVa, the permittee shall implement the requirements from 40 CFR 60, Subpart VVa (LDAR) and in accordance with **Compliance Demonstration Method** (2) to **1. Operating Limitations** for emission units 025A and 025B (EPN FUG-ETH-VVa and EPN FUG-ETH) in permit for a leak as defined as a reading of 500 ppmv.
(3) For units not subject to 40 CFR 60, Subpart VVa, but subject to 401 KAR 51:017, the permittee shall comply with the requirements of 40 CFR 60, Subpart VVa and in accordance with **Compliance Demonstration Method** (1) to **1. Operating Limitations** for emission units 025A and 025B (EPN FUG-ETH-VVa and EPN FUG-ETH) in permit for a leak as defined as a reading of 500 ppmv.

Pursuant to 401 KAR 52:020, Section 10, the permittee shall use the following control efficiencies while calculating potential emissions from each fugitive component:

(1) 97% for valves in gas/vapor and light liquid service;
(2) 0% for valves in heavy liquid service;
(3) 85% for pumps in light liquid service;
(4) 0% for pumps in heavy liquid service;
(5) 75% for connectors in gas/vapor and light liquid service;
(6) 85% for all compressors; and
(7) 97% for relief valves in gas/vapor service.

Existing fugitive components in natural gas service are not monitored or subject the requirements of 40 CFR 60, Subpart VVa or 401 KAR 51:017; and are therefore uncontrolled.

Emission Unit (EPN ET-1) and (FF-1), Ethylene Wastewater Treatment System

Initial Construction Date: 1992

Process Description:

(EPN ET-1) Ethylene Wastewater Pre-treatment Plant

Description - The wastewater pre-treatment plant receives and treats wastewater from various processes within the Ethylene Plant in order to remove benzene from the wastewater prior to discharge to the facility-wide secondary wastewater treatment plant. Vents from this system are controlled by either #8 & #9 furnaces (EPN# 327 & 328) or by the Ethylene Flare. The wastewater pre-treatment plant consists of approximately 562 valves, 17 relief valves, 2164 flanges and 25 pumps (Emissions from the fugitive components are reported under EU# 025, EPN FUG-ETH-YY) and the following tanks:

NOTE - The pipeline equipment count listed above reflects an accurate count of the equipment as of the date of issuance of this permit but is not intended to limit the permittee to the exact numbers specified. The permittee may add or remove pipeline equipment without a permit revision as long as the equipment continues to comply with the applicable requirements listed below and the changes do not result in significant increase in potential to emit (PTE).

TK-191 Equalization Tank (14,000 gals.)
TK-192A CPI Oil/Water Separator (11,800 gals.)
TK-192B CPI Oil/Water Separator (11,800 gals.)
TK-194A ISF Unit (3,100 gals.)
TK-194B ISF Unit (3,100 gals.)
TK-194C ISF Unit (3,100 gals.)
TK-195 Recovered Oil Tank (4,000 gals.)
TK-196 Oil Transfer Tank (2,000 gals.)
TK-198A Caustic Neutralization Tank (7,000 gals.)
TK-198B Caustic Neutralization Tank (7,000 gals.)
TK-201 Knockout Tank (1,000 gals.)
TK-202 Slop Oil Tank (1,000 gals.)
TK-211 Contaminated Water Collection Tank (650 gals.)
Construction commenced: 1992.

(EPN FF-1) Ethylene Plant-wide Uncontrolled Benzene Emissions

Description – (FF-1) includes various waste streams in the facility that are uncontrolled for benzene emissions from the Ethylene Stormwater System and water going to the Secondary Wastewater treatment after being treated in the Ethylene Wastewater Pre-Treatment Plant consists of the following fugitive components:

EU# 025C (EPN FF-1):

Light Liquid Flanges/connectors: 649 Light Liquid Valves: 177

Applicable Regulation:

401 KAR 59:095, New oil-effluent water separators. (EPN ET-1 only)

401 KAR 57:002, Section 1(2), 40 CFR 61, Subpart FF, National emission standard for benzene waste operations.

Emission Unit (EPN ET-1) and (FF-1), Ethylene Wastewater Treatment System

401 KAR 63:002, Section 2(4)(nn), 40 C.F.R. 63.1080 through 63.1097, Tables 1 and 2 (Subpart XX), National Emission Standards for Ethylene Manufacturing Process Units: Heat Exchange Systems and Waste Operations.

401 KAR 63:002, Section 2(4)(oo), 40 C.F.R. 63.1100 through 63.1114 (Subpart YY), National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards.

Comments:
All Tanks associated with EPN ET-1 are vented and controlled as specified in 40 CFR 61, Subpart FF. With the emissions venting to the flare, cracking furnace #8 and #9, there are no emissions calculations associated with this emission unit.

EPN FF-1 fugitive emissions are calculated using emission factors from EPA 453/R-95-017 Table 2-1, and Mass balance. There are no control efficiencies associated with these fugitive components as they are not monitored.
Emission limitations are permitted under EU# 028 (EPN EE-5), as the Ethylene wastewater treatment facility routs to the Activated Sludge Bio-treatment System/Secondary Wastewater Treatment System in the Westlake Vinyls, Inc. – Vinyls Plant under Permit V-19-016.

Requirements under 40 CFR 61, Subpart FF include: operate with no detectable emissions above 500 ppm background as tested annually, measure the benzene concentration of the waste stream exiting the treatment process, continuously monitor and record process parameters for the treatment process, monitoring the fixed roof tank seals, access doors and openings quarterly and visually inspect the closed vent system and control device quarterly.

If the flare is unavailable and the waste stream is not being routed to the cracking furnaces, the permittee may use the River VCU (EPN 342). The River VCU would be subject to closed vent system and control device monitoring as specified under 40 CFR 61, Subpart FF.

Emission Unit #008 (EPN 342), River VCU (ET-23)

Initial Construction Date: 1989

Process Description:

EU# 008 (EPN 342)	**River VCU (ET-23)**
Rated Capacity:	18.0 mmBtu/hr, process fuel gas-fired

The John Zink Model GV-ZTOF Hydrocarbon Vapor Combustion Unit burns the vent streams from the aromatic gasoline and ethylene fuel oil barge loading operations. It is a natural gas fired unit with a rated capacity burner of 18 mmBtu/hr. At times during plant shutdowns and when Ethylene Flare is not available, the River VCU (EPN 342) may be used as an alternative control device for (EPN ET-1) the Ethylene WWT Pre-treatment Unit.

Applicable Regulation:
401 KAR 50:012, General Application, applies to the River VCU.

Emission Unit #008 (EPN 342), River VCU (ET-23)

401 KAR 63:002, Section 2(4)(q), 40 C.F.R. 63.560 through 63.568 (Subpart Y), National Emission Standards for Marine Tank Vessel Loading Operations.

Comments:
Pilot flame emissions are calculated using AP-42 Chapter 1.4, Aromatic Gas and Fuel Oil loading emissions are calculated using AP-42 Chapter 13.5 for VOC, NO_X and CO, SO_2 is calculated using AP-42 Chapter 1.3. HAPs are calculated using mass balance and total VOC emissions.

The River VCU is subject to the requirements of 401 KAR 51:012, and shall operate at all times while aromatic gas and/or fuel oil is being loaded into barges at the river.

For requirements under 40 CFR 63, Subpart Y: retain records of the emissions estimates determined by either testing or industry standard practices.

As mentioned under EPN ET-1, the River VCU may be used as a process vent control device if the flare is unavailable. As such the River VCU should be treated as a control device under 40 CFR 61, Subpart FF for a closed vent system, and records should be kept accordingly.

Emission Unit #023 (EPN 364A), No. 4A Cooling Water Tower

Pollutant	Emission Limit or Standard	Regulatory Basis for Emission Limit or Standard	Emission Factor Used and Basis	Compliance Method
PM	2.58 lb/hr	401 KAR 61:020, Section 3(2)(a)	0.167 lb/mmGal based on 0.001% drift & 2000 ppmw TDS	Compliance assumed based on Manufacturer's Guarantee of mist eliminator
	40% Opacity	401 KAR 61:020, Section 3(1)(a)	N/A	

Initial Construction and/or Modification Date: 1963; 2017 (Upgraded)

Process Description:
EU# 023 (EPN 364A) **No. 4A Cooling Water Tower (Non-contact cooling tower)**
Maximum Processing Rate: 1.125 mmGal/hr
Control: Mist eliminator, with manufacturer's guarantee of 0.001% drift loss

Applicable Regulation:
401 KAR 61:020, Existing process operations.

401 KAR 63:002, Section 2(4)(nn), 40 C.F.R. 63.1080 through 63.1097, Tables 1 and 2 (Subpart XX), National Emission Standards for Ethylene Manufacturing Process Units: Heat Exchange Systems and Waste Operations.

401 KAR 63:002, Section 2(4)(oo), 40 C.F.R. 63.1100 through 63.1114 (Subpart YY), National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards.

Emission Unit #023 (EPN 364A), No. 4A Cooling Water Tower

Precluded Regulations:
401 KAR 63:002, Section 2(4)(j), 40 C.F.R. 63.400 through 63.407, Table 1 (Subpart Q), National Emission Standards for Hazardous Air Pollutants for Industrial Process Cooling Towers.

Comments:
To preclude 40 CFR 63, Subpart Q, the permittee shall not use chromium-based water treatment chemicals in any affected IPCT as demonstrated by recordkeeping.

The cooling towers are non-contact type, resulting in PM emissions from the makeup water only.

For requirements under 40 CFR 63, Subpart YY, the permittee shall follow 40 CFR 63, Subpart XX: monitor for leaks to cooling water and monitor cooling water for HAPs listed in Table 1 of 40 CFR 63, Subpart XX.

The Division received an application for a 502(b)(10) Change (APE20160003) on December 14, 2016 to replace three of the four cells in the No. 4 Cooling Water Tower (EPN 364) and to rename the unit to No. 4A Cooling Water Tower (EPN 364A). With the notification, the existing drift eliminators were replaced with more efficient ones with a manufacturers guarantee of 0.001% drift. On January 17, 2017, the Division issued an approval letter for the equipment change at the cooling tower, but had not changed the equipment name or EPN number. With the Administrative Amendment (APE20220001) received January 21, 2022, the Division has accepted to rename the unit to No. 4A Cooling Water Tower (EPN 364A). The designation number for the unit has remained the same for KYEIS purposes, since only parts of the unit were updated, but not replaced as a whole.

The PSD significant revision application (APE20190002) received by the Division updated the dissolved solids content from 1,500 ppmw to 2,000 ppmw.

The increase in emissions from the installation of the modification (EPN 364A) does not trigger further review from 401 KAR 51:017 PSD.

Pursuant to a 502(b)(10) Change (APE20160003) received by the Division on December 14, 2016, the cooling tower was upgraded and renamed. The original emission unit was not removed and replaced, therefore original commencement date for the unit is still before July 2, 1975, meaning that 401 KAR 59:010 does not apply.

Emission Unit 379 (EPN 379) EMACT Applicable Maintenance Vents

Initial Construction Date: July 6, 2023

Process Description:
EU# 379 (EPN 379) EMACT Applicable Maintenance Vents
This is applicable to a vent designated as a maintenance vent because the vent is only used as a result of startup, shutdown, maintenance, or inspection of equipment where equipment is emptied, depressurized, degassed, or placed into service.

Emission Unit 379 (EPN 379) EMACT Applicable Maintenance Vents
Applicable Regulation: 401 KAR 63:002, Section 2(4)(oo), 40 C.F.R. 63.1100 through 63.1114 (Subpart YY), National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards. **Comments:** July 6, 2023 was used as the construction date for the various maintenance vents as it was the effective date for 40 CFR 63, Subpart YY for which existing ethylene production equipment would have to have been in compliance.

SECTION 3 – EMISSIONS, LIMITATIONS AND BASIS (CONTINUED)

Testing Requirements\Results

Emission Unit(s)	Control Device	Parameter	Regulatory Basis	Frequency	Test Method	Permit Limit	Test Result	Throughput &Operating Parameter(s) Established During Test	Activity Graybar	Date of last Compliance Testing
007	Ethylene Flare	VE, Heat Value, Velocity	40 CFR 60.18	Initial	2, 18, 22	No VE, >300 Btu/scf, < 60 ft/sec	No VE/ 613 Btu/scf/ 7.4 ft/sec	None Reported	CMN2004 0001	6/8/2004
007	Ethylene Flare	VE, Heat Value, Velocity	40 CFR 60.18	*Initial[1]	2, 9, 18, 22	No VE, >300 Btu/scf, < 60 ft/sec	2.7% Opacity, 1,162 Btu/scf, 14.25 ft/sec	134,000 lb/hr feed gas	CMN2005 0001	5/10/2005
008	River Flare	VE, Heat Value, Velocity	40 CFR 60.18	*Initial[1]	2, 9, 18,s 22	No VE, <89.5 ft/sec, >300 Btu/scf	35.35 ft/sec, 702 Btu/scf	976.60 acfm	CMN2006 0003	4/28/2006
007	Ethylene Flare	VE, Heat Value, Velocity	40 CFR 60.18	*Initial[1]	1, 2, 9, 18, 22	No VE, >300 Btu/scf, < 60 ft/sec.	No VE, 11.75 ft/sec, 473 Btu/scf	None Reported	CMN2007 0002	3/15/2007
				*Initial[1]	18/ Alt 100 and ASTM D1946, 22	No VE, >300 Btu/scf, < 60 ft/sec.	No VE, 669 Btu/scf, 5.85 ft/sec	3.77mmlb/day feed gas	CMN2015 0002	4/23/2015
							No VE, 712 Btu/scf, 6.29 ft/sec	30 gal/min	CMN2016 0001	10/18/2016

Footnotes:

[1] Flare is re-tested to demonstrate compliance at a higher production rate.

Emission Unit(s)	Control Device	Parameter	Regulatory Basis	Frequency	Test Method	Permit Limit	Test Result	Throughput &Operating Parameter(s) Established During Test	Activity Graybar	Date of last Compliance Testing
007B[2]	Temporary Flare	VE, Heat Value, Velocity	40 CFR 60.18	Initial	2, 18/Alt 100, 22	No VE, >300 Btu/scf, < 60 ft/sec	No VE/ 634 Btu/scf/ 4.5 ft/sec	182,680 lb/hr	CMN20210001	8/3/2021
006C	SCR	CO	401 KAR 51:017, Section 8	Initial and every 5 years	TBD	0.013 lb/mmBtu	TBD	TBD	TBD	TBD
		$PM/PM_{10}/PM_{2.5}$				0.007 lb/mmBtu	TBD	TBD	TBD	TBD
		NO_X		Initial	7E or 20	0.0095 lb/mmBtu	TBD	TBD	TBD	TBD
EPN 326A	Integrated cyclone scrubber	CO	401 KAR 52:020, Section 10	Initial and every 5 years	TBD	197.67 lb/hr	TBD	TBD	TBD	TBD
		CO_2				932 tpy	TBD	TBD	TBD	TBD
007A	Flare	Opacity	40 CFR 63.670(h)	Initial and once per day/ continuous	22	0%	TBD	TBD	TBD	TBD

Footnotes:

[2] 007B (EPN 321B) was installed via a 502(b)(10) Change approved (APE20210002) on March 17, 2021.

SECTION 4 – SOURCE INFORMATION AND REQUIREMENTS

Table A - Group Requirements:

Emission and Operating Limit	Regulation	Emission Unit
190 mmBtu/hr each on a 24-hr average 170 mmBtu/hr each on a 12-month rolling basis	401 KAR 52:020, Section 10	005A-C
135 mmBtu/hr each on a 24-hr average 127 mmBtu/hr each on a 12-month rolling basis		006A-B

Table B - Summary of Applicable Regulations:

Applicable Regulations	Emission Unit
401 KAR 50:012 General Application.	008
401 KAR 51:017 Prevention of significant deterioration of air quality.	006C, 007A, EPN 326A, 025, 025A, 025B
401 KAR 57:002, Section 1(2), 40 CFR 61, Subpart J, National emission standard for equipment leaks (fugitive emission sources) of benzene.	025
401 KAR 57:002, Section 1(2), 40 CFR 61, Subpart FF, National emission standard for benzene waste operations.	(EPN ET-1), 025C (FF-1)
401 KAR 59:015, New Indirect Heat Exchangers.	005A-D, 006A-C, RRH
401 KAR 59:095, New oil-effluent water separators.	(EPN ET-1),
401 KAR 60:002, Section 2(2)(ccc), 40 C.F.R. 60.480a through 60.489a (Subpart VVa), Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006.	025A
401 KAR 60:002, Section 2(2)(ppp), 40 C.F.R. 60.660 through 60.668 (Subpart NNN), Standards of Performance for Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations.	DRH, RRH, 007A
401 KAR 60:002, Section 2(2)(ttt), 40 C.F.R. 60.700 through 60.708 (Subpart RRR), Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes.	005A-D, 006A-C, DRH, RRH, 007A
401 KAR 61:015, Existing Indirect Heat Exchangers.	DRH
401 KAR 63:002, Section 2(1), 40 C.F.R. 63.1 through 63.16, Table 1 (Subpart A), General Provisions.	007A
401 KAR 63:002, Section 2(4)(q), 40 C.F.R. 63.560 through 63.568 (Subpart Y), National Emission Standards for Marine Tank Vessel Loading Operations.	008
401 KAR 63:002, Section 2(4)(t), 40 C.F.R. 63.640 through 63.679 (Subpart CC), National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries.	007A

Table B - Summary of Applicable Regulations (Continued):

Applicable Regulations	Emission Unit
401 KAR 63:002, Section 2(4)(ii), 40 C.F.R. 63.980 through 63.999 (Subpart SS), National Emission Standards for Closed Vent Systems, Control Devices, Recovery Devices and Routing to a Fuel Gas System or a Process.	007A
401 KAR 63:002, Section 2(4)(kk) 40 C.F.R. 63.1019 through 63.1039, Table 1 (Subpart UU), National Emission Standards for Equipment Leaks - Control Level 2 Standards.	025
401 KAR 63:002, Section 2(4)(mm), 40 C.F.R. 63.1060 through 63.1067 (Subpart WW), National Emission Standards for Storage Vessels (Tanks).	022
401 KAR 63:002, Section 2(4)(nn), 40 C.F.R. 63.1080 through 63.1097, Tables 1 and 2 (Subpart XX), National Emission Standards for Ethylene Manufacturing Process Units: Heat Exchange Systems and Waste Operations.	(EPN ET-1), 023
401 KAR 63:002, Section 2(4)(oo), 40 C.F.R. 63.1100 through 63.1114 (Subpart YY), National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards.	005A-D, 006A-C, 007A, 332, 022, (EPN ET-1), 025, 023, 379
401 KAR 63:002, Section 2(4)(iiii), 40 C.F.R. 63.7480 through 63.7575, Tables 1 through 13 (Subpart DDDDD), National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters.	DRH, RRH
401 KAR 63:015, Flares.	007A
401 KAR 63:020, Potentially Hazardous Matter or Toxic Substances.	025A

Table C - Summary of Precluded Regulations:

Applicable Regulations	Emission Unit
401 KAR 63:002, Section 2(4)(j), 40 C.F.R. 63.400 through 63.407, Table 1 (Subpart Q), National Emission Standards for Hazardous Air Pollutants for Industrial Process Cooling Towers.	023

Table D - Summary of Non Applicable Regulations:
None

Air Toxic Analysis
401 KAR 63:020, Potentially Hazardous Matter or Toxic Substances.
The Division for Air Quality (Division) has accepted an Air Toxics Air Quality Analysis Report submitted by the facility on September 8, 2020. The report lists the results of a performed AERMOD of potentially hazardous matter or toxic substances (1,3-Butadiene, Benzene, Methanol, Naphthalene, Styrene, Toluene, Xylenes (Total)) that may be emitted by the facility based upon the process rates, material formulations, stack heights and other pertinent information that are also provided in the report. 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

Westlake Vinyls, Inc. – Vinyls Plant, Westlake Chemical OpCo LP, and Westlake Vinyls, Inc. - PVC Plant are all subsidiaries of Westlake Corporation, have the same SIC and are located within a contiguous area. Though the facilities each have separate Title V permits, the facilities are a single major source, pursuant to 401 KAR 52:001, Section 1(45)(a) definitions. Each permittee is responsible and liable for their own violations, unless there is a joint cause for the violations. Westlake Vinyls Inc. - Vinyls Plant, Westlake Chemical OpCo LP, and Westlake Vinyls Inc. - PVC Plant are a single major source, as defined by 401 KAR 52:020, Title V Permits, and 401 KAR 51:017, Prevention of Significant Deterioration of Air Quality (PSD). Permit V-20-022 covers only Westlake Chemical OpCo LP.

SECTION 5 – PERMITTING HISTORY

Permit	Permit Type	Activity#	Complete Date	Issuance Date	Summary of Action
V-00-022	Initial Issuance	F903	4/5/2000	6/30/2000	Initial Title V Permit
V-05-011	Renewal	APE20050001	4/21/2005	12/18/2008	Permit Renewal
V-05-011 R1	Minor Revision	APE20110002	3/23/2011	7/8/2011	Minor Revision
V-05-011 R2	Minor Revision	APE20120003 APE20120004 APE20120006	8/11/2012 9/13/2012 12/21/2012	3/15/2013	Minor Revision
V-13-041	Renewal	APE20130002 APE20130004 APE20130006	6/24/2013 8/15/2013 10/3/2013	4/28/2014	Minor Revision, Permit Renewal and Significant Revision
V-13-041 R1	Minor Revision	APE20130008 APE20130009 APE20140004 APE20140006 APE20140007	3/8/2014 8/18/2014	4/24/2015	Removal of Ethylene Plant
V-14-022	Initial	APE20140001	8/18/2014	10/26/2015	Initial Title V Permit
V-14-022 R1	Minor Revision	APE20160001 APE20160002	3/1/2016 4/28/2016	7/22/2016	Voluntary Disclosure with the Addition of VVa Components and the Expansion Project
V-14-022 R2	Significant Revision	APE20190002	8/30/2019	3/7/2021	2020 Expansion Project
V-20-022	Minor Revision	APE20200002	5/22/2020		De-Ethanizer Bottoms Processing, Replacement of EPN 332B, Addition of EPN 332C/D
	Renewal	APE20200003	10/16/2020		Title V Renewal
V-20-022 R1	Admin Amendment	APE20220001	3/14/2022	1/23/2023	Listed reqs. for EPN 329 only, asked for testing of CO2 rather than CO2e at EPN 326A, incorporated 502(b)(10) Change from Jan. 17, 2017.
	Minor Revision	APE20220002	6/7/2022		Installation of Flare Gas Recovery System to route excess flare gas to existing combustion devices. Updates to FUG-ETH-VVa fugitive components, addition of FUG-ETH-YY fugitive components.
	Admin Amendment	APE20220003	3/14/2022		Removal of EPNs 332C, 332D, 373, and Insignificant Activity EPN 326
V-20-022 R2	Admin Amendment	APE20220006	1/24/2023	TBD	Corporate level name change. No change to facility name or permit
	Minor Revision	APE20220007	1/27/2023		Increased firing rates of Furnaces 1, 2, 3, and 7 based on production increase from the Advanced Process Control Project ((502)(b)(10) Change incorporated in permit V-20-022.)

SECTION 5 – PERMITTING HISTORY (CONTINUED)

Permit	Permit Type	Activity#	Complete Date	Issuance Date	Summary of Action
V-20-022 R2	Minor Revision	APE20230002	Minor Revision	TBD	Revision of 40 CFR 63, Subpart YY requirements. Additional physical and operational changes.
	Significant Revision	APE20230004	5/2/2024		Incorporation of Consent Decree for EPN 321A

SECTION 6 – PERMIT APPLICATION HISTORY

Permit Number: V-20-022 R1 Activities: APE20220001, APE20220002, APE20220003

Application:	Received Date(s):	Application Complete Date(s):
APE20220001	January 21, 2022	March 14, 2022
APE20220002	February 22, 2022	June 7, 2022
APE20220003:	February 22, 2022	March 14, 2022

Permit Action: ☐ Initial ☐ Renewal ☐ Significant Rev ☒ Minor Rev ☒ Administrative

Construction/Modification Requested? ☒Yes ☐No NSR Applicable? ☐Yes ☒No

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

Description of Action:
APE20220001 (Administrative Amendment):

- Several requirements in the permit for Ethylene Furnace 10 (EPN 329) were amended so that it was clear that the requirements were for EPN 329 alone.
- The requirement to test for CO_2e for EPN 326A was amended to require testing for CO_2 as there is no EPA Test Method for CO_2e and CO_2 is the only GHG expected to be part of CO_2e for the unit.
- Incorporated the 502(b)(10) Change for the change in equipment name and EPN number of emission unit 023 to No. 4A Cooling Tower (EPN 364A) as applied to the Division on December 14, 2016. (Approval letter of equipment modification was issued on January 17, 2017)
- No change in emissions occurred as a result of the Administrative Amendment.

APE20220002 (Minor Revision):

- Installation of a Flare Gas Recovery System (FGRS) in order to recover flare gas consisting of excess plant process gas, vapors from tank car, barge and tank truck loading/unloading operations, transfer line purges, and vents from various tanks in the ethylene plant.
- There will be no increase in production from the addition of the FGRS.
- Flare gas will be routed to existing combustion devices at the Westlake Chemical OpCo LP (Westlake OpCo) and Westlake Vinyls, Inc. – Vinyls Plants. The flare gas will be part of the process fuel gas that is permitted to be fired in the emission units listed in the table below.

Emission Unit	EPN	Description
Westlake Vinyls, Inc. – Vinyls Plant / E&E Plant		
005	009	Boiler #2
013B	013	Boiler #6
Westlake OpCo		
005A	305	Cracking Furnace #1
005B	306	Cracking Furnace #2
005C	307	Cracking Furnace #3

Emission Unit	EPN	Description
Westlake OpCo		
005D	311	Cracking Furnace #7
006A	327	Cracking Furnace #8
006B	328	Cracking Furnace #9
006C	329	Cracking Furnace #10
DRH	313	Dryer Regeneration Heater
RRH	314	Reactor Regeneration Heater
Westlake Vinyls, Inc. – Vinyls Plant / Monomers Plant		
CAP	437	Catoxid Air Preheater
032	453	Oxy Thermal Incinerator
033	530	Primary Thermal Incinerator
010	514	South Cracking Furnace #13
011	526	North Cracking Furnace 1A
	527	North Cracking Furnace 2A
012A/D	534	EDC Cracking Furnace #3 / #3A
012B	535	EDC Cracking Furnace #4
012C	536	EDC Cracking Furnace #5

- The installation of the FGRS will include two compressors, a seal drum, a liquid separator vessel, process instrumentation, new foundations, and associated process piping and fugitive components. Fugitive components associated with the FGRS will be added to EPN FUG-ETH-YY.
- In past applications, 23 compressors had been represented as being subject to 40 CFR 60, Subpart VVa and 2 compressors had been represented in as being subject to 40 CFR 63, Subpart YY. The compressors had also been represented as being entirely enclosed or venting emissions from the crankcase to a control device. During subsequent reviews by Westlake, it was determined that there are only 14 existing compressors in the Ethylene Plant and none of them are entirely enclosed or vent emissions from the crankcase to a control device. Furthermore, it was determined that none of the existing compressors contain or contact a fluid (liquid or gas) that is at least 5% by weight of total organic HAP as determined according to 40 CFR 63.180(d). Therefore, the number of existing components has been updated to reflect that there are 14 compressors subject to 40 CFR 60, Subpart VVa and zero existing compressors subject to 40 CFR 63, Subpart YY.
- A control of 85% as provided in the TCEQ document "Air Permit Technical Guidance for Chemical Sources: Equipment Leak Fugitives" has been applied to the compressors at the facility.
- The project will not involve increasing the design capacity as part of the FGRS project. The only emissions increase at the facility are from the installation of fugitive components associated with the installation of the FGRS and the increase in the PTE of regulated NSR pollutants subject to 40 CFR 60, Subpart VVa which had previously been evaluated as having zero emissions. The number of components being added as part of the FGRS as part of EPN FUG-ETH-YY are as follows:

Component	Service	Control (%)	FGRS Components
Valves	Gas	97	166
	LL	97	30
	HL	0	0
Pump Seals	LL	100	0
	LL	85	2
	HL	30	2
Connectors (Flanges)	Gas	75	664
	LL	75	120
	HL	0	0
Compressor Seals	All	85	2
PRVs to Flare	All	100	4

- The number of compressors for which there will be an increase in emissions as a result of the review of existing compressors at the facility subject to 40 CFR 60, Subpart VVa are as follows:

Component	Service	Control (%)	Component Count
Compressor Seals	All	85	14

- The BAE of the above fugitive components will be zero since the new components would not have existed before the project and the existing compressors were represented as having 100% control. Therefore the project emissions increase from the current minor revision after subtracting the BAE from the PAE would only be equal to the PAE, or in this case the PTE of the total components listed above. The project emissions increase is as shown in the table below:

PSD Criteria Pollutant	**VOC**	**CO_2e**
Emissions Increase	5.57	45.46
PSD Significance Emissions Rate	40	75,000
Further PSD Review Needed.	No	No

APE20220003 (Administrative Amendment):

- Removed EPN 332C and 332D from the permit.
- Removed the Insignificant Activity EPN 326 from the permit.
- Removed the Portable Air Compressor Engine EPN 373 from the permit. This unit was permanently replaced with an electric compressor.
  No increase in emission occurred as a result of the Administrative Amendment.

Updated Netting Analysis for NO_X

Westlake opted to calculate increases and decreases in actual emissions for NO_X, in order to show that the net emissions increase for NOx from the PSD 2020 Expansion Project was not considered a significant increase to trigger further analysis under PSD. The updated NOx Netting Analysis Summary for Westlake Chemical OpCo LP, Westlake Vinyls, Inc. – Vinyls Plant, and Westlake Vinyls, Inc. – PVC Plant as of March 2022 (based on all applications received by the Division) is shown below.

Facility	Contemporaneous Emission (tpy)
Westlake Vinyls, Inc. – Vinyls Plant	-188.78
Westlake Chemical OpCo LP	0
Westlake Vinyls, Inc. – PVC Plant	0.65
Total from project emissions increase	152.16
Total Contemporaneous Increases/Decreases	-188.13
Total net emissions increase	-35.97

V-20-022 R1 Emission Summary				
Pollutant	2020 Actual (tpy)	Previous PTE V-20-022 (tpy)	Change (tpy)	Renewal PTE V-20-022 R1 (tpy)
CO	164.18	388.28	0	388.28
NO_X	158.69	213.54	0	213.54
PT	29.29	49.10	-0.10	49.00
-PM_{10}	29.29	49.10	-0.41	48.69
$PM_{2.5}$	29.29	41.68	-0.92	40.76
SO_2	10.13	2.31	0	2.31
VOC	171.10	199.60	5.49	205.09
Lead	--	0	0	0
Greenhouse Gases (GHGs)				
Carbon Dioxide	130,891	1,014,274	0	1,014,274
Methane	18.68	91.04	1.82	92.86
Nitrous Oxide	5.8	1.64	0	1.64
CO_2 Equivalent (CO_2e)	133,086	1,017,038	46	1,017,084
Hazardous Air Pollutants (HAPs) and Toxic Air Pollutants (TAPs)				
1,3-Butadiene	6.43	5.06	0.097	5.16
*Ammonia (anhydrous)	--	9.001	0	9.001
Benzene	21.32	22.49	1.02	23.51
Toluene	4.10	3.00	0.24	3.24
Xylenes (Total)	2.55	1.85	0.16	2.01
Combined HAPs:	34.41	32.42	1.52	33.94

*Pursuant to 401 KAR 63:060, Section 2, Ammonia is not in the list of Hazardous air pollutants, and is not included in the Combined HAPs shown above.

Permit Number: V-20-022 Activities: APE20200002, APE20200003

Application:	Received Date(s):	Application Complete Date(s):
APE20200002	March 31, 2020	May 22, 2020
APE20200003:	April 22, 2020	October 16, 2020

Permit Action: ☐ Initial ☒ Renewal ☐ Significant Rev ☒ Minor Rev ☐ Administrative

Construction/Modification Requested? ☒Yes ☐No NSR Applicable? ☐Yes ☒No

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

APE20200001: Implementation of an Advanced Process Control System to optimize operations in the Ethylene Plant received on March 10, 2020. The control system will monitor and share data across multiple units in order to optimize production capacity. The expected optimization will increase the actual capacity of the facility by 3.5MMlb/yr of ethylene.

APE20200004: Installation of a fuel oil tank (EPN 332BR), was received on June 22, 2020. The new tank will be located where the old Fuel Oil Tank 332B was originally located.

Description of Action:
APE20200002 (Minor Permit Revision):

- Processing of 60 to 80 railcars of De-ethanizer bottoms.
- Addition of two 21,000 gallon fixed roof fuel oil tanks (EPN 332C and EPN 332D)
- Removal of existing fuel oil tanks 332A and 332B.
- Increase in actual fuel oil production at EPN 325 (insignificant activity) from 1,088.21 Mgal/yr to 1,106 Mgal/yr
- The table below shows that the additional processing of the De-ethanizer bottom railcars does not trigger further review from 401 KAR 51:017 Prevention of Significant Deterioration (PSD).

PSD Criteria Pollutant	CO	NO_x	SO_2	PM	PM_{10}	$PM_{2.5}$	VOC
Emissions Increase	0.1086	0.0655	0.0004	0.004	0.004	0.004	1.37
PSD Significance Emissions Rate	100	40	40	25	15	10	40
Further PSD Review Needed.	No	No	No	No	No	No	No

APE20200003 (Renewal):

- Renewal of V-14-022 R2 (Proposed Permit), the increase in emissions from the Significant Revision (APE20190002) shall occur only upon issuance of V-20-022 final permit.
- Updating the maximum hourly heat rating of the Ethylene flare (EPN 321) to accommodate for the new waste gas stream content.
- Addition of particulate emissions from the Ethylene flare (EPN 321) pilot gas combustion.
- Equipment leak components for the wastewater pre-treatment plant (EPN FF-1) are being updated to include current component counts.

- Wastewater treatment fugitives subject to 40 CFR 63, Subpart YY have been added as insulated and non-monitored components.

- Update to the potential emissions calculation method for the n-propanol tank (EPN 318) according to the equations in AP-42 Chapter 7, updated in June 2020.
- Update to the potential emissions calculation method for the Aromatic Gasoline tanks (EPN 319 and 320) according to the equations in AP-42 Chapter 7, updated in June 2020.
- Removal of power rating from the description of the portable emergency engine, to account for variable units that may be used at the facility.
- Addition of 40 CFR 63, Subpart YY requirements as finalized on July 6, 2020 in the Federal Register 85 FR 40386.

V-20-022 Emission Summary				
Pollutant	2018 Actual (tpy)	Previous PTE V-14-022 R2 (tpy)	Change (tpy)	Renewal PTE V-20-022 (tpy)
CO	108.80	388.28	0	388.28
NO_X	141.44	213.54	0	213.54
PT	18.91	49.10	0	49.10
PM_{10}	18.91	49.10	0	49.10
$PM_{2.5}$	18.91	41.68	0	41.68
SO_2	1.76	2.31	0	2.31
VOC	183.63	195.29	4.31	199.60
Lead	0		0	0
Greenhouse Gases (GHGs)				
Carbon Dioxide	147115	532,612	481,662	1,014,274
Methane	20.95	109.17	-18.13	91.04
Nitrous Oxide	6.19	5.49	-3.85	1.64
CO_2 Equivalent (CO_2e)	149,483	536,977	480,061	1,017,038
Hazardous Air Pollutants (HAPs) and Toxic Air Pollutants (TAPs)				
1,3-Butadiene	4.78	4.98	0.08	5.06
*Ammonia (anhydrous)		9.001	0	9.001
Benzene	43.91	21.39	1.1	22.49
Toluene	10.09	2.7	0.03	3.00
Xylenes (Total)	6.32	1.68	0.17	1.85
Combined HAPs:	65.12	30.80	1.62	32.42

*Pursuant to 401 KAR 63:060, Section 2, Ammonia is not in the list of Hazardous air pollutants, and is not included in the Combined HAPs shown above.

APPENDIX A – ABBREVIATIONS AND ACRONYMS

BACT – Best Available Control Technology
Btu – British thermal unit
CO – Carbon Monoxide
CO_2 – Carbon Dioxide
CO_2e – Carbon Dioxide Equivalent
Division – Kentucky Division for Air Quality
GHG – Greenhouse Gas
HAP – Hazardous Air Pollutant
LDAR – Leak Detection and Repair
mmBtu – Million British thermal units
mmGal – Million Gallons
MMlb – Million Pounds
mmscf – Million Standard Cubic Feet
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
TDS – Total Dissolved Solids
TOC – Total Organic Compounds
VOC – Volatile Organic Compounds