Commonwealth of Kentucky
Division for Air Quality

REVISED STATEMENT OF BASIS / SUMMARY

Title V, Construction/Operating
Permit: V-19-016 R2
Westlake Vinyls, Inc. – Vinyls Plant
Calvert City, KY 42029
February 13, 2024
Brian Harley, Reviewer

SOURCE ID:	21-157-00039
AGENCY INTEREST:	2966
ACTIVITY:	APE20210010, APE20210011, APE20220001, APE20220002, APE20220007, APE20220009, APE20220012, APE20220014, APE20230001, APE20230005, APE20230011, APE20240001

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SECTION 1 – SOURCE DESCRIPTION

SIC Code: 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: 122899 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): 1,2-Dichloroethane, Hydrochloric Acid, Vinyl Chloride

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

*PTE does not include self-imposed emission limitations.

Description of Facility:
The Westlake Vinyls, Inc. – Vinyls Plant (Vinyls Plant) is comprised of three operational areas: Chlor-Alkali Plant; Energy & Environmental Operations; and the Monomer Plant. The Chlor-Alkali Plant processes treated brine to produce chlorine, sodium hydroxide, and hydrogen gas using a membrane cell electrolyzer process. The Energy & Environmental process area provides utilities such as steam for the Westlake Vinyls plant and manages the wastewater treatment plants. The Westlake Monomers plant produces vinyl chloride monomer (VCM) through the thermal decomposition of 1,2 dichloroethane (EDC) to form VCM and hydrogen chloride (HCl).

The majority of VCM produced is piped directly to the Westlake PVC plant, and the remainder is sent out by pressurized railcars or cylinders. The emissions from the railcar loading are sent to EPN 453 and EPN 530. Excess Hydrogen Chloride is removed from the furnace and sent back to the oxychlorination reactor to produce more EDC.

SECTION 2 – CURRENT APPLICATION AND EMISSION SUMMARY FORM

Permit Number: V-19-016 R2

Activities: APE20210010, APE20210011, APE20220001, APE20220002, APE20220007, APE20220009, APE20220012, APE20230001, APE20230005, APE20230011, APE20240001

Application:	Received Date(s):	Application Complete Date(s):
APE20210010	November 29, 2021	March 3, 2022
APE20210011	November 19, 2021	October 18, 2023
APE20220001	February 22, 2022	September 14, 2022
APE20220002	February 22, 2022	March 3, 2022
APE20220007	June 3, 2022	September 14, 2022
APE20220009	July 26, 2022	September 14, 2022
APE20220012	October 13, 2022	March 15, 2023
APE20220014	September 23, 2022	January 23, 2023
APE20230001	January 31, 2023	March 14, 2023
APE20230005	March 8, 2023	October 19, 2023
APE20230011	October 12, 2023	October 24, 2023
APE20240001	March 11, 2024	April 29, 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

502(b)(10) Change

APE20210001: The application received on March 1, 2021 was for the addition of natural gas flow to the Vinyl Chloride Flare (EPN 524) to ensure that the net heating value requirements of 40 CFR 60.18 are met. It has been demonstrated that the increase in emissions associated with the change will not exceed any significant emission rates as defined in 401 KAR 51:001. The results are as follows:

PSD Criteria Pollutant	NO_X	CO	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Emissions (tpy)	0.20	6.29	5×10^{-3}	5×10^{-3}	5×10^{-3}	4×10^{-4}	13.27
PSD SER (tpy)	40	100	25	15	10	40	40
Further PSD Review	No	No	No	No	No	No	No

502(b)(10) Change

APE20210002: The application received on May 20, 2021 was for removal of the #2A Firewater Pump (EPN 081A), and installation of #2B Firewater Pump (EPN 081B) in its place. The new firewater pump has a fuel consumption of 14.6 gph, which is 0.5 gph greater than the previous firewater pump. The same requirements from 40 CFR 63, Subpart ZZZZ and 40 CFR 60, Subpart IIII apply so there will be no new change in emission limitations or requirements in the permit. It has been demonstrated that the increase in emissions associated

with the change will not exceed any significant emission rates as defined in 401 KAR 51:001. The results are as follows:

PSD Criteria Pollutant	NO_X	CO	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Emissions (tpy)	0.07	0.04	4×10^{-3}	4×10^{-3}	4×10^{-3}	2×10^{-4}	4×10^{-3}
PSD SER (tpy)	40	100	25	15	10	40	40
Further PSD Review	No	No	No	No	No	No	No

Off-Permit Change

APE20210005: The application received on August 3, 2021 was for the removal of seven temperature control valves associated with the Oxy Reactor preheaters to be replaced with straight pipe spools. The temperature of the reactors will be increased from 350°F to 380°F in order to reduce dew point corrosion in the preheaters; will utilize the boilers at the facility to produce an additional 0.0028 mmBtu/hr steam, but without increasing the PTE at the boilers. Furthermore, no additional piping equipment components will be added and there will not be any upstream or downstream impacts. It has been demonstrated that the increase in emissions associated with the change will not exceed any significant emission rates as defined in 401 KAR 51:001. The results are as follows:

PSD Criteria Pollutant	NO_X	CO	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Emissions (tpy)	6×10^{-3}	5×10^{-6}	1×10^{-4}	1×10^{-4}	1×10^{-4}	8×10^{-6}	7×10^{-5}
PSD SER (tpy)	40	100	25	15	10	40	40
Further PSD Review	No	No	No	No	No	No	No

502(b)(10) Change

APE20210007: The application received on September 13, 2021 was for the temporary installation of two 21,000 gallon fixed roof frac tanks for wet light ends storage. The tanks were connected to the existing wet VCl vent header for control. After being filled, the tanks would remain in place with no throughput for up to 180 days. Potential emissions include working and breathing losses from the two tanks and emissions associated with the use of the existing incinerators EPN 453 and 530. It has been demonstrated that the increase in emissions associated with the change will not exceed any significant emission rates as defined in 401 KAR 51:001. The results are as follows:

PSD Criteria Pollutant	NO_X	CO	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Emissions (tpy)	3×10^{-5}	3×10^{-4}	3×10^{-5}	3×10^{-5}	3×10^{-5}	0.00	2×10^{-1}
PSD SER (tpy)	40	100	25	15	10	40	40
Further PSD Review	No	No	No	No	No	No	No

Off-Permit Change

APE20210009: The application received on November 10, 2021 was for the installation of a heat exchanger for the demineralized water (DM) system associated with the membrane cell technology in the Chlorine Plant in order to remove mercury from the system. The steam needed for the heat exchanger will utilize an additional 0.15 mmBtu/hr from boilers at the facility without increasing the PTE at the facility. Furthermore, no additional piping equipment components

will be added and there will not be any upstream or downstream impacts. It has been demonstrated that the increase in emissions associated with the change will not exceed any significant emission rates as defined in 401 KAR 51:001. The results are as follows:

PSD Criteria Pollutant	NO_X	CO	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Emissions (tpy)	0.336	3×10^{-4}	5×10^{-3}	5×10^{-3}	5×10^{-3}	4×10^{-4}	4×10^{-3}
PSD SER (tpy)	40	100	25	15	10	40	40
Further PSD Review	No	No	No	No	No	No	No

Off-Permit Change

APE20220005: The application received on March 14, 2022 was for the removal of the existing brine start-up heat exchanger and installation of a larger brine start-up heat exchanger. The new heat exchanger will allow for 100% of the brine flow to flow through the heat exchanger compared to the approximately 75% of the flow allowed by the existing heat exchanger. The steam needed for the heat exchanger will utilize an additional 2.7 mmBtu/hr from boilers at the facility without increasing the PTE at the facility. Furthermore, there will not be any upstream or downstream impacts related to the new heat exchanger. It has been demonstrated that the increase in emissions associated with the change will not exceed any significant emission rates as defined in 401 KAR 51:001. The results are as follows:

PSD Criteria Pollutant	NO_X	CO	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Emissions (tpy)	6.05	5×10^{-3}	9×10^{-2}	9×10^{-2}	9×10^{-2}	7×10^{-3}	7×10^{-2}
PSD SER (tpy)	40	100	25	15	10	40	40
Further PSD Review	No	No	No	No	No	No	No

Off-Permit Change

APE20220008: The application received on July 18, 2022 was for the installation of a temporary heat exchanger so that the High Temperature Direct Chlorination Reactor (HTDC) can be taken down for maintenance. The steam needed for the temporary heat exchanger will utilize an additional 4 mmBtu/hr from boilers at the facility for a maximum of 48 hours without increasing the PTE at the facility. Furthermore, the addition of the temporary heat exchanger will necessitate the use of temporary valves and connectors. However, there will not be any upstream or downstream impacts related to the temporary equipment and the increase in emissions associated with the change will not exceed any significant emission rates as defined in 401 KAR 51:001. The results are as follows:

PSD Criteria Pollutant	NO_X	CO	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Emissions (tpy)	0.049	4×10^{-5}	8×10^{-4}	8×10^{-4}	8×10^{-4}	6×10^{-5}	3×10^{-3}
PSD SER (tpy)	40	100	25	15	10	40	40
Further PSD Review	No	No	No	No	No	No	No

Off-Permit Change

APE20220010: The application received on September 16, 2022 was for the installation of a stab heater type heat exchanger to heat catalyst before it enters the South EDC Oxy A and B Reactors and thus prevent corrosion to the reactor coils. The steam needed for the heat exchanger will utilize an additional 0.05 mmBtu/hr from boilers at the facility without increasing the PTE at the facility. Furthermore, there will not be any upstream or downstream impacts related to the new heat exchanger. It has been demonstrated that the increase in emissions associated with the change will not exceed any significant emission rates as defined in 401 KAR 51:001. The results are as follows:

PSD Criteria Pollutant	NO_X	CO	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Emissions (tpy)	0.11	9×10^{-5}	2×10^{-3}	2×10^{-3}	2×10^{-3}	1×10^{-4}	1×10^{-3}
PSD SER (tpy)	40	100	25	15	10	40	40
Further PSD Review	No	No	No	No	No	No	No

Off-Permit Change

APE20220013: The application received on November 29, 2022 was for the increased inlet pipe diameter of the fuel gas delivery line to the 60 mmBtu/hr primary incinerator (EPN 530) in order to achieve the fuel consumption that EPN 530 is rated for. The 1 inch diameter pipe could not achieve the fuel consumption required to meet the rated 60 mmBtu/hr of the unit. Therefore, the inlet pipe will be increased from 1 inch to 1.25 inches in diameter. While the increased fuel flow to EPN 530 will increase actual emissions, the PTE of EPN 530 will not increase, nor will there be an increase in production due to the increased fuel flow. Since the PTE for each pollutant for this emission unit is below the significant emission level for 401 KAR 51:017, and the increase in fuel consumption has not changed the PTE, thus demonstrating that the increase in emissions associated with the change will not exceed any significant emission rates as defined in 401 KAR 51:001.

Off-Permit Change

APE20230004: The application received on March 1, 2023 was for the replacement of the packing in the Oxy Incinerator Scrubber (EPN 453). The replacement of the packing is a maintenance activity and will not increase the emissions from the scrubber, but will likely increase the removal efficiency of the scrubber. However, there will be no increase or decrease in actual emissions or PTE due to the replacement of the packing material. Performance testing was conducted on 1/3/2024 under CMN20240002.

Off-Permit Change

APE20230006: The application received on March 15, 2023 was for the replacement of the packing in the Primary Incinerator Scrubber (EPN 530). The replacement of the packing is a maintenance activity and will not increase the emissions from the scrubber, but will likely increase the removal efficiency of the scrubber. However, there will be no increase or decrease in actual emissions or PTE due to the replacement of the packing material. Performance testing was conducted on 1/4/2024 under CMN20240001.

502(b)(10) Change

APE20230008: The application received on March 24, 2023 was to install low NO_X burners on the existing EDC Cracking Furnace #4 (EPN 535). The new burners have emission factors for NO_X, CO, VOC, and particulate matter which are guaranteed by the manufacturer. The emissions from the cracking furnace have decreased due to the installation of the low NO_X burners, but it has nevertheless been demonstrated that the change in emissions associated with the change will not exceed any significant emission rates as defined in 401 KAR 51:001. The results are as follows:

PSD Criteria Pollutant	NO_X	CO	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Prior Emissions (tpy)	30.40	38.48	3.48	3.48	3.48	0.27	2.52
New Emissions (tpy)	15.42	18.22	2.34	2.34	2.34	0.27	2.52
PSD SER (tpy)	40	100	25	15	10	40	40
Further PSD Review	No	No	No	No	No	No	No

502(b)(10) Change

APE20230009: The application received on March 24, 2023 was for the replacement of the B-Column of the EDC Recovery Columns (EPN EE-4). The B-Column is being replaced with an identical column and there will not be any increase or decrease in actual emissions or PTE due to the replacement.

502(b)(10) Change

APE20230012: The application received on August 25, 2023 was for the replacement of the existing South Decoking Pot (emission unit 034B (EPN 520)). The decoking pot is utilized by EDC cracking furnaces #13 and #5, EPNs 514 and 536, respectively. As the new decoking pot was constructed after July 2, 1975, it will be subject to the requirements of 401 KAR 59:010, whereas the two remaining decoking pots will remain subject to 401 KAR 61:020 as they were constructed before July 2, 1975. It has been demonstrated that the increase in emissions associated with the installation of the new decoking pot (emission unit 034D (EPN 520A)) will not exceed any significant emission rates as defined in 401 KAR 51:001. The results are as follows:

PSD Criteria Pollutant	CO	PM	PM_{10}	$PM_{2.5}$
Emissions (tpy)	3.24	0.24	0.23	0.22
PSD SER (tpy)	100	25	15	10
Further PSD Review	No	No	No	No

502(b)(10) Change

APE20240002: The application received on Augusts 5, 2024 was to install a new nitrogen preheater in the Monomers Plant, HE-03. The preheater will utilize steam to prevent dewpoint corrosion on the Catox Overhead relief valve in the plant. 300 lb/hr of steam (0.42 lb/mmBtu) will be utilized from Boiler #6 which will increase the amount of actual emissions at the facility, but will not increase the PTE of emissions at the facility. The change in emissions from the utilization of Boiler #6 will not exceed any significant emission rates as defined in 401 KAR 51:001. The results are as follows:

PSD Criteria Pollutant	NO_X	CO	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Emissions (tpy)	0.068	0.068	0.014	0.014	0.014	0.001	0.010
PSD SER (tpy)	40	100	25	15	10	40	40
Further PSD Review	No	No	No	No	No	No	No

502(b)(10) Change

APE20240003: The application received on October 31, 2024 was to install a new heat exchanger on South Synthesis Oxy Reactor Catalyst in the Monomers Plant. The preheater will utilize steam to prevent dewpoint corrosion on the catalyst. 2,500 lb/hr of steam (3.5 lb/mmBtu) will be utilized from Boiler #6 which will increase the amount of actual emissions at the facility, but will not increase the PTE of emissions at the facility. The change in emissions from the utilization of Boiler #6 will not exceed any significant emission rates as defined in 401 KAR 51:001. The results are as follows:

PSD Criteria Pollutant	NO_X	CO	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Emissions (tpy)	0.57	0.57	0.11	0.11	0.11	0.009	0.08
PSD SER (tpy)	40	100	25	15	10	40	40
Further PSD Review	No	No	No	No	No	No	No

Description of Action:

APE20210010 (Administrative Amendment):

On November 29, 2021, the Division received an application for an administrative amendment to clarify that three requirements listed in Section B of permit V-19-016 R1 for EDC Cracking Furnace #3A (EPN 534A) only applied to that emission unit.

No other changes in requirements or emissions resulted from this administrative amendment.

APE20210011 (Minor Revision):

- On November 19, 2021, the Division received an application for a minor revision to install a NO_X and O_2 CEMS on Boilers #2 and #6 (EPN 009 and EPN 013). The monitoring, recordkeeping, and reporting requirements affected by the implementation of the CEMS would change in the permit, but there would be no change in emissions as part of the change.
- Minor corrections and clarifications were also addressed and made in the permit.

APE20220001 (Minor Revision):

- On February 22, 2022, the Division received an application for a minor revision for the 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 Westlake Chemical OpCo, LP 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 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
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 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 fugitive components added to the Westlake Chemical OpCo, LP plant in order to facilitate the FGRS. There will be no increase in actual emissions at the Westlake Vinyls, Inc. – Vinyls Plant from any existing emission units.

APE20220002 (Administrative Amendment):
On February 22, 2022, the Division received an application for an administrative amendment for the following changes:

- Removal of two temporary frac tanks authorized by a 502(b)(10) Change (APE20210007) received by the Division on September 13, 2021
- Removal of Insignificant Activities EPN 889 Brine Treatment Tank – Bag Dumping, EPN 032 H_2SO_4 Storage Tank (60 gal), EPN 035 H_2SO_4 Day Tank (50 gal), EPN 076 Sulfite Tank Bag Dumping, and EPN 413 No. 4 River Tank (500,206 gal).
- Insignificant Activity EPN 452, South Synthesis Brine Storage Tank capacity was corrected from 3,760 gallons to 4,136 gallons.
- Insignificant Activities EPN 825A HCl Acid Head Tank #2, EPN 836 Caustic Tank, EPN 855A Sulfuric Acid Head Tank #3, and EPN 895 Chilled Water Machine to be listed under the Chlor-Alkali Plant. They had mistakenly been listed under the Monomers Plant.
- Insignificant Activity EPN 090 Urea Tank (8,500 gallons) to be listed under the Energy and Environmental Plant. It had mistakenly been listed under the Monomers Plant.

- No changes in requirements or increases in emissions resulted from this administrative amendment.

APE20220007 (Minor Revision):

- On June 3, 2022, the Division received an application for a minor revision to add requirements to **Section H** of the permit for the continued use of the existing conveyor system of the Salt Handling and Transfer Operations (EPN 801) until the conveyor and drop-point configuration of EPN 801 permitted in V-19-016 R1 is to begin operation. Furthermore, language has been added to the comments section for EPN 801 based on discussions between Westlake Vinyls, Inc. and the Division in relation to the "lot line of the property" as referenced by 401 KAR 63:010.
- No changes in requirements or emissions resulted from this minor revision.

APE20220009 (Administrative Amendment):

- On July 26, 2022, the Division received an application for an administrative amendment to correct a typo in the permit in the requirement to determine the outlet concentrations for EPN 013 and EPN 534A in terms of ppmw, lb/mmBtu, and lb/mmscf. The typo was "ppmw" and has been corrected to "ppmv".
- No other changes in requirements or emissions resulted from this administrative amendment.

APE20220012 (Minor Revision):

- On October 13, 2022, the Division received an application for a minor revision to remove the Atmospheric Scrubber (EPN 877) located in the Chlorine Plant of the Chlor-Alkali Plant at the facility. EPN 877 is being removed due to the small amount of chlorine and low flow rates through the scrubber that could not otherwise be effectively controlled by the Sodium Hypochlorite Tower (EPN 813A). Based on the application received on October 13, 2022 and an addendum application received on February 3, 2023, the equipment being rerouted from EPN 877 are as follows:

    - A UP Brine tank will be vented to the atmosphere as it emits no chlorine, VOC, or other HAP;
    - A dechlorinated brine tank will be vented to EPN 813A due to chlorine emissions; and
    - A Barometric Seal tank will be vented to EPN 813A due to chlorine emissions.

- The application received on October 13, 2022 had called for an anolyte tank being rerouted to EPN 813A, but the tank was already being vented back into the process. Therefore it would not be affected by the removal of EPN 877.
- EPN 877 has an estimated control efficiency of 99% and the respective PTE is 0.13 lb/hr and 0.57 tpy. Division approved performance testing on April 15, 2021 resulted in controlled chlorine emissions of 3.6×10^{-5} lb/hr and 1.6×10^{-4} tpy, respectively. Furthermore when adding the uncontrolled emission from EPN 877 to EPN 813A and applying 99.95% control as certified by the manufacturer, the increase in emissions is 5.67×10^{-4} tpy. Therefore dispersions modeling was not conducted. Also, since no NSR pollutants are affected by the change, no PSD analysis is required.
- While receiving the waste streams from the three tanks above, the average outlet flowrate from EPN 877 was 51 scfm as measured during the Division approved April 15, 2021 performance test. Furthermore, EPN 813A has a design flow rate of 12,000 scfm. Therefore EPN 813A will be capable of receiving the two waste streams (UP Brine Tank vents will vent to the

atmosphere) from EPN 877 without increasing the throughput that the PTE for EPN 813A is based on.

In October 2024 the Division was notified that the Atmospheric Scrubber has not yet been decommissioned at the facility. The requirements for EPN 877 have been inserted back into the permit and the unit will be removed at such time that the permittee submits an application to remove the unit.

APE20220014 (Administrative Amendment):

- On September 23, 2022, the Division received an application for an administrative amendment to rename Westlake Chemical Corporation to Westlake Corporation, on a corporate level, effective on September 30, 2022. However, the permittee/source name of Westlake Vinyls, Inc. – Vinyls Plant has not changed.

APE20230001 (Minor Revision):

- On January 31, 2023, the Division received an application for a minor revision for the installation of two new emergency generator engines in the Chlorine Plant (EPN 090) and the E&E Plant (EPN 091). The engines are EPA Certified. Furthermore, it has been demonstrated that the increase in emissions associated with installation of the engines will not exceed any significant emission rates as defined in 401 KAR 51:001. The results are as follows:

PSD Criteria Pollutant	NO_X	CO	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Emissions (tpy)	4.04	0.32	0.027	0.027	0.027	0.005	0.037
PSD SER (tpy)	40	100	25	15	10	40	40
Further PSD Review	No	No	No	No	No	No	No

APE20230005 (Significant Revision):

- On March 8, 2023, the Division received an application for a significant revision to update the NO_X emission limitation issued in permit V-19-016 for EPN 013 to preclude the applicability of 401 KAR 51:017, to account for different load conditions.
- The NO_X emission limitation will be modified to account for boiler loads at and above 25% load and less than 25% load, as follows:
  - NO_X emissions from EPN 013 shall not exceed 0.037 lb NO_X/mmBtu when firing at greater than or equal to 25% load (52.5 mmBtu/hr); and
  - NO_X emissions from EPN 013 shall not exceed 32.67 tpy on a rolling 12-month basis.
- Specific Monitoring Requirements and Specific Recordkeeping Requirements have been add to the permit to show continuous compliance with the updated emission limitation.
- There will be no increase or decrease in actual emissions or PTE due the significant revision.

In October 2024, the Division received additional information from the facility requesting a short term 3-hour rolling average 7.77 lb/hr limitation on NO_X instead of the 0.037 lb NO_X/mmBtu limitation when firing at greater than or equal to 25% load. The limitation is the product of the manufacturer's 30-day emission factor of 0.037 lb NO_X/mmBtu and the maximum permitted hourly firing rate of 210 mmBtu/hr. Compliance will continue to be shown through the use of CEMS at the facility.

APE20230011 (Significant Revision):

- On October 12, 2023, the Division received an application for a significant revision to incorporate requirements for the Vinyl Chloride Flare (EPN 524) which are specified and required by the Consent Decree 2:22-cv-0157-JDC-KK. Only those requirements which are relevant to the unassisted Vinyl Chloride Flare at Westlake Vinyls, Inc. have been incorporated into Section B of permit V-19-016 R2.

APE20240001 (Minor Revision):

- On March 11, 2024, the Division received an application for a minor revision for the installation of a new additional emergency generator engine in the Chlorine Plant (EPN 092). The engine is EPA Certified and it has been demonstrated that the increase in emissions associated with installation of the engine will not exceed any significant emission rates as defined in 401 KAR 51:001. The results are as follows:

PSD Criteria Pollutant	**NO_X**	**CO**	**PM**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**VOC**
Emissions (tpy)	2.57	0.22	0.013	0.013	0.013	0.002	0.005
PSD SER (tpy)	40	100	25	15	10	40	40
Further PSD Review	No	No	No	No	No	No	No

V-19-016 R2 Emission Summary				
Pollutant	2023 Actual (tpy)	Previous PTE V-19-016 R1 (tpy)	Change (tpy)	Revised PTE V-19-016 R2 (tpy)
CO	196.03	522.36	-19.45	502.91
NO_X	112.30	180.12	-8.05	172.07
PT	24.64	51.68	-0.79	50.89
PM_{10}	21.14	42.96	-0.80	42.16
$PM_{2.5}$	16.49	33.24	-0.80	32.44
SO_2	1.21	2.90	0.02	2.92
VOC	117.76	205.30	0.16	205.46
Greenhouse Gases (GHGs)				
Carbon Dioxide	304,697	531,182.97	1,104.3	532,287.3
Methane	712.67	542.39	0.06	542.45
Nitrous Oxide	2.64	5.97	0.01	5.98
CO_2 Equivalent (CO_2e)	323,302	546,521.23	1,108.6	547,629.8
Hazardous Air Pollutants (HAPs)				
1,2-Dichloroethane	22.026	25.094	--	25.094
Benzene	7.124	2.877	0.003	2.880
Carbon Tetrachloride	0.186	5.292	--	5.292
Chlorine	1.156	3.438	-0.573	2.865
Chloroethane	0.056	2.912	--	2.912
Chloroform	0.075	1.324	--	1.324
Hydrochloric Acid	4.292	62.500	--	62.500
Naphthalene	13.345	5.215	--	5.215
Styrene	8.422	3.224	--	3.224
Toluene	1.416	0.547	0.001	0.548
Vinyl Chloride	11.241	30.776	--	30.776
Combined HAPs:	59.491	144.406	-0.56	143.846

SECTION 3 – EMISSIONS, LIMITATIONS AND BASIS

Emission Unit: 013 (EPN 801) Salt Handling and Transfer Operations

Initial Construction Date or Modification Date: 013 – 1966, 2019 (Modified), 8/2022 (Modified)

Process Description:

013 (EPN 801) Salt Handling and Transfer Operations

Maximum salt throughput – 757,740 tons per year (tpy)

EPN 801A	Salt Hopper
EPN 801B	Hopper to Conveyor Belt Transfer
EPN 801E	Conveyor to Conveyor Belt Transfer
EPN 801F	Conveyor to Conveyor Belt Transfer
EPN 801C	Stockpile Loading Operations
EPN 801D	Stockpile Storage - Wind Erosion
801A, B, C, & D	Date of Construction: 1966 (salt throughput increased 2019)
801E & F	Date of Construction: 2022
Area	2 acres

Applicable Regulation:

401 KAR 63:010, Fugitive emissions, applies to the salt handling and transfer operations.

Comments:

The salt handling (EPN 801A/B/C/D) increased from 620,000 tpy to 740,220 tpy pursuant to activity APE20180010. Activity APE200190010 increased the salt throughput to 757,740 tpy based on a higher conversion factor of tons of salt consumed per tons of chlorine produced. The existing equipment did not change for the increased production. The maximum annual salt throughput for emission unit 013 shall not exceed 757,740 tons per year.

The use of wet suppression with the existing conveyor system has necessitated its replacement. The new conveyor system will use partial enclosures at the new transfer towers/drop points for 85% control of particulate matter at EPN 801E and 801F; and plastic sheeting will partially block wind at the drop to the salt pile for 70% control of particulate matter at EPN 801C.

Based on discussions with Westlake Vinyls, Inc., the "lot line of the property" is the property boundary of the Westlake Vinyls, Inc. – Vinyls Plant, as extended by the portion of the ambient air boundary that moves out from the property boundary into and along the Tennessee River. The ambient air boundary is identified in the PSD Air Quality Analysis Report submitted to the Division in March 2020.

Emission Units: 019A (EPN 849A) Cooling Water Tower CT-5A, 040 (EPN 853) Cooling Water Tower CT-6, 894 (EPN 894) Cooling Water Tower CT-7

Pollutant	Emission Limit or Standard	Regulatory Basis for Emission Limit or Standard	Emission Factor Used and Basis	Compliance Method
PM	019A: 2.34 lb/hr 040: 2.34 lb/hr 894: 2.34 lb/hr	401 KAR 59:010 Section 3(2)	019A: 0.834 lb/mmgal[1] 040: 0.0834 lb/mmgal[1] 894: 0.1668 lb/mmgal[1]	Compliance is assumed based on the information provided in the application.[2]
	20% Opacity	401 KAR 59:010 Section 3(1)(a)	NA	

Emission Units: 019A (EPN 849A) Cooling Water Tower CT-5A, 040 (EPN 853) Cooling Water Tower CT-6, 894 (EPN 894) Cooling Water Tower CT-7

Initial Construction Date: 019A – 2014; 040 – 2008; 894 – Proposed 2020

Process Description:

019A (EPN 849A) Cooling Water Tower CT-5A
2 cells with recirculation rate of 18,700 gal/min total
Equipped with mist eliminator with 0.005% Drift Loss
Non-contact Cooling Tower

040 (EPN 853) Cooling Water Tower CT-6
3 cells with recirculation rate of 15,200 gallons/minute total
Equipped with mist eliminator with 0.0005% Drift Loss
Non-contact cooling Tower

894 (EPN 894) Cooling Water Tower CT-7
3 cells with recirculation rate of 12,000 gallons/minute total
Equipped with mist eliminator with 0.001% Drift Loss
Non-contact cooling Tower

Applicable Regulation:
401 KAR 59:010, New process operations, applies to each affected facility or source, associated with a process operation, which is not subject to another emission standard with respect to particulates in 401 KAR Chapter 59, commenced on or after July 2, 1975.

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

Comments:
Based on the recirculation rates, density of water, TSP's and manufacturer guarantees of the mist eliminators of each cooling tower, the maximum tons per hour throughput of the solid particles flowing through the cooling towers are less than 0.50 tons per year. Therefore, for applicability of 401 KAR 59:010, the equations for throughputs over 0.50 tons per year are not necessary.

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.

[1] = PM/PM_{10}/$PM_{2.5}$ EF from "Calculating Realistic PM_{10} Emissions from Cooling Towers," Abstract No. 216, Session No. AM-1b, Joel Reisman and Gordon Frisbie, Greystone Environmental Consultants, Inc., 4/11/2002

[2] = Mist Eliminator Manufacturer Guarantee of 0.005% for EPN 849A, 0.0005% for EPN 853, and 0.001% for EPN 894.

**Emission Units: 014A (EPN 813A) Sodium Hypochlorite Tower,
015 (EPN852) Membrane Cell Room Ventilation,
016 (EPN877) Atmospheric Scrubber,
017 (EPN887), 017A (EPN887A) HCl Synthesis Scrubbers**

Initial Construction Date and/or Modification Date: 014A – 2015; 015 – 1966 (modified 2002) 017 – 1966 (modified 2002); 017A – 2014; 016 – 2002;

Process Description:

014A (EPN 813A) Sodium Hypochlorite Tower

Vent streams containing chlorine from process equipment are collected and vented through the Sodium Hypochlorite Tower. Each tower is a packed bed scrubber using sodium hydroxide solution to neutralize the chlorine in the scrubber. The vent streams controlled include vapors from the Westlake CA&O chlorine production process equipment, chlorine wastewater treatment systems, chlorine barge and railcar loading/unloading operations, and chlorine storage bullets.

015 (EPN 852) Membrane Cell Room Ventilation

The ridge vents from the building are expected to emit chlorine (Cl_2) from fugitive sources within the Cell Room. Emission rates of HAP_s are estimated using maximum expected Cl_2 concentration.

017 and 017A (EPN 887 and 887A) HCl Synthesis Scrubbers

Vent is expected to emit hydrogen chloride (HCl) and chlorine (Cl_2). Emission rates of HAPs are estimated using design vent gas flow rate and design vent gas characteristic (based on manufacturer's specifications). The HCl absorber is integral to the production process and not a control device.

016 (EPN 877) Atmospheric Scrubber

Vent streams containing chlorine from process equipment are collected and vented through the Atmospheric Scrubber/Vent. This tower is a packed bed scrubber using sodium hydroxide solution to neutralize the chlorine in the scrubber. The vent streams controlled include streams from the CA&O chlorine production process equipment and chlorine wastewater treatment systems.

Applicable Regulation:

401 KAR 63:020, Potentially hazardous matter or toxic substances [State-Origin Requirement], applies to each affected facility which emits or may emit potentially hazardous matter or toxic substances, provided that such emissions are not elsewhere subject to the provisions of the administrative regulations of the Division. This applies to the chlorine emissions from the three scrubbers, membrane cell room ventilation, and sodium hypochlorite tower.

Non-Applicable Regulations:

401 KAR 63:002, Section 2(4)(a), 40 C.F.R. 63.100 to 63.107, Tables 1 to 4 (Subpart F), National Emission Standards for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry

401 KAR 63:002, Section 2(4)(b), 40 C.F.R. 63.110 to 63.153, Tables 1 to 37, and Figure 1 (Subpart G), National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater

**Emission Units: 014A (EPN 813A) Sodium Hypochlorite Tower,
015 (EPN852) Membrane Cell Room Ventilation,
016 (EPN877) Atmospheric Scrubber,
017 (EPN887), 017A (EPN887A) HCl Synthesis Scrubbers**

401 KAR 63:002, Section 2(4)(c), 40 C.F.R. 63.160 to 63.183, Tables 1 to 4 (Subpart H), National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks

Comments:
Pursuant to 401 KAR 52:020, Section 10, emission units 017 (EPN 887) and 017A (EPN 887A) shall be designed as integral absorbers and scrubbers such that the units will shut down in case of burner or absorber/scrubber failure.

Performance Testing for EPN 877 was completed on 4/15/2021 (CMN20200002) with a test result of 3.6×10^{-5} lb/hr. The uncontrolled emissions factor has been added to that for EPN 813A.

**Emission Units: 018 (EPN FUG-CA-1) Chlor-alkali Plant Cl_2/HCl Fugitives,
020 (EPN FUG-CA-2) Chlor-alkali Plant Fugitives**

Initial Construction Date and/or Modification Date: 018 – 1996 (2002); 020 – 1996 (2002);

Process Description:

018 (EPN FUG-CA-1) Chlor-alkali Plant Cl_2/HCl Fugitives

Process ID's 1-5 Chlorine & Hydrogen Chloride Fugitive emissions from the following:

1,199	Gas/Vapor Valves	14	Light Liquid Pumps
6,959	Gas/Vapor Flanges	5	Compressors
63	Pressure Relief Valves		

020 (EPN FUG-CA-2) Chlor-alkali Plant Fugitives

Process ID's 1-4 Stream composition (by average weight fraction): 98% Carbon Tetrachloride and 2% Nitrogen Trichloride. VOC Fugitive emissions from the following:

27	Light Liquid Valves	2	Light Liquid Pumps
159	Flanges	3	Pressure Relief Valves
6	Valves (Natural Gas)	20	Flanges (Natural Gas)

Applicable Regulation:
401 KAR 63:020, Potentially hazardous matter or toxic substances [State-Origin Requirement], applies to each affected facility which emits or may emit potentially hazardous matter or toxic substances, provided that such emissions are not elsewhere subject to the provisions of the administrative regulations of the Division. This applies to the chlorine and VOC emissions from the units listed above (EPN FUG-CA-1 and EPN FUG-CA-2).

Non-Applicable Regulations:
401 KAR 57:002, Section 2, 40 C.F.R. 61.240 to 61.247, Tables 1 to 2 (Subpart V) National Emission Standard for Equipment Leaks (Fugitive Emission Sources). Pursuant to 40 CFR 61.240(b), the provisions of 40 CFR 61, Subpart V apply to the sources listed in 40 CFR 61.240(a) after the date of promulgation of a specific subpart in 40 CFR 61. There are no other regulations

Emission Units: 018 (EPN FUG-CA-1) Chlor-alkali Plant Cl_2/HCl Fugitives, 020 (EPN FUG-CA-2) Chlor-alkali Plant Fugitives
that apply to EPN FUG-CA-1 and EPN FUG-CA-2 which specifically refer to 40 CFR 61, Subpart V. Therefore, 40 CFR 61, Subpart V is not applicable. 401 KAR 60:005, Section 2(2)(bbb), 40 C.F.R. 60.480 to 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. 40 CFR 60, Subpart VV applies to facilities with process units, components assembled to produce, as intermediate or final products, one or more of the chemicals listed in 40 CFR 60.489. The Chlor-Alkali Plant produces chlorine, sodium hydroxide, hydrochloric acid, and hydrogen gas: none of which are listed in 40 CFR 60.489. The Chlor Alkali Plant Fugitives (EPN FUG CA-2) does emit carbon tetrachloride as a pollutant. However, the carbon tetrachloride is neither produced, nor used as an intermediate. It is a processing aid brought in from outside suppliers. Therefore, 40 CFR 60, Subpart VV does not apply to the Chlor-Alkali Fugitive emissions. 401 KAR 63:002, Section 2(4)(lll), 40 C.F.R. 63.2430 to 63.2550, Tables 1 to 12 (Subpart FFFF), National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing. Pursuant to 40 CFR 63.2435(b), a miscellaneous organic chemical manufacturing process unit (MCPU) includes equipment necessary to operate a miscellaneous organic chemical manufacturing process, as defined in 40 CFR 63.2550, that satisfies all of the conditions specified in 40 CFR 63.2435(b)(1) through (3). According to 40 CFR 63.2435(b)(1), the MCPU must produce material or family of materials that is described in 40 CFR 63.2435(b)(1)(i), (ii), (iii), (iv), or (v). Pursuant to 40 CFR 63.2435(c)(5), production activities described using the 1997 version of NAICS codes 325181 are exempt as specified in 40 CFR 63.2435(b)(1)(i) and (ii), and therefore are not subject to the requirements of 40 CFR 63, Subpart FFFF. **Comments:** 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.

Emission Units: 005 (EPN 009) Boiler #2, 013B (EPN 013) Boiler #6					
Pollutant	**EU**	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis**	**Compliance Method**
NO_X	005	Low and high heat release rates of 0.10 and 0.20 lb/mmBtu, respectively	40 CFR 60.44b(a)(1)	37 lb/mmscf NG 12.025 lb/mmscf NG+H_2 (2017 Stack Test)	Initially with 40 CFR 60.46b(c). Continually with 40 CFR 60.46b(e) & 40 CFR 60.48b(b)(1) CEMS
PM		0.10 lb/mmBtu each	401 KAR 59:015, Section 4(1)(b)	7.451 lb/mmcsf NG (AP-42, Ch 1.4)	Burning gaseous fuel as defined in 40 CFR 63.7575.
		20% Opacity	401 KAR 59:015, Section 4(2)	N/A	

Emission Units: 005 (EPN 009) Boiler #2, 013B (EPN 013) Boiler #6					
SO_2	005, 013B	0.8 lb/mmBtu each	401 KAR 59:015, Section 5(1)(b)(1)	0.588 lb/mmscf NG (AP-42 1.4)	
CO	013B	0.037 lb/mmBtu; 32.67 tpy, 12-month rolling basis	401 KAR 51:017, Section 8	37 lb/mmscf NG 12.025 lb/mmscf NG+H_2 (Manufacturer)	(BACT)[3,4] CO testing; Initial and every 5 years Monthly and 12-month rolling total emission records.
PM, PM_{10}, $PM_{2.5}$	013B	1.56 lb/hr; 6.23 tpy, 12-month rolling basis	401 KAR 51:017, Section 8	7.451 lb/mmcsf NG (AP-42, Ch 1.4)	
VOC	013B	1.13 lb/hr; 4.51 tpy, 12-month rolling basis	401 KAR 51:017, Section 8	5.39 lb/mmscf NG (AP-42, Ch 1.4)	
CO_2e	013B	98,255.05 tpy, 12-month rolling basis	401 KAR 51:017, Section 8	116,888.95 lb/mmscf NG (40 CFR 98, Subpart C)	(BACT) See Comments[5,6]
NO_X	013B	0.037 lb/mmBtu @ ≥ 25% Load, 32.67 tpy, 12-month rolling basis,	401 KAR 52:020, Section 10	37 lb/mmscf NG 12.025 lb/mmscf NG+H_2 (Based on Boiler #2 Stack Test)	Low NO_X Burners Initial and 5 year NO_X Testing 40 CFR 60.48b(b)(1) CEMS

Initial Construction Date: 005 – 2016; 013B – 2022

Process Description:

005 (EPN 009) Boiler #2
Type: Indeck Boiler Type D
Capacity: 191.0 mmBtu/hr (NG)
201.58 mmBtu/hr (NG +PF+ H_2)
Fuel: Natural Gas or Process Fuel Gas [1]
Control Device: None

013B (EPN 013) Boiler #6
Type: Indeck Boiler Type D or Equivalent With Oxygen-Trim System
Capacity: 191.0 mmBtu/hr (NG)
201.58 mmBtu/hr (NG +PF+ H_2)
Fuel: Natural Gas or Process Fuel Gas [1]
Control Device: None

Westlake submitted the notification for installation of EPN 013 on August 22, 2022.

Applicable Regulation:
401 KAR 51:017, Prevention of Significant Deterioration of Air Quality applies to the construction of a new major stationary source or a project at an existing major stationary source that commences construction after September 22, 1982, and locates in an area designated attainment or unclassifiable under 42 U.S.C. 7407(d)(1)(A)(ii) and (iii). Westlake Vinyls, Inc. – Vinyls Plant is a major source pursuant to Prevention of Significant Deterioration of Air Quality (PSD) and is subject to the requirements of PSD for 013B (EPN 013).

401 KAR 59:015, New indirect heat exchangers, applies to the particulate matter and sulfur dioxide emissions for each indirect heat exchanger commenced on or after April 9, 1972 with a heat input capacity at or below 250 mmBtu/hour, and more than one (1) mmBtu/hour. Boilers #2 and #6 are subject to 401 KAR 59:015.

Emission Units: 005 (EPN 009) Boiler #2, 013B (EPN 013) Boiler #6

401 KAR 60:005 Section 2(2)(c), 40 C.F.R. 60.40b to 60.49b (Subpart Db), Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units, applies to each steam generating unit that commences construction, modification, or reconstruction after June 19, 1984, and that has a heat input capacity from fuels combusted in the steam generating unit of greater than 100 million British thermal units per hour mmBtu/hr. Boilers #2 and #6 are subject to 40 CFR 60, Subpart Db.

401 KAR 60:005 Section 2(2)(ppp), 40 C.F.R. 60.660 to 60.668 (Subpart NNN), Standards of Performance for Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations, applies to (1) each distillation unit not discharging its vent stream into a recovery system, each combination of a distillation unit and the recovery system into which its vent stream is discharged, and (3) each combination of two or more distillation units and the common recovery system into which their vent streams are discharged that is part of a process unit that produces any of the chemicals listed in 40 CFR 60.667 as a product, co-product, by-product, or intermediate, except as provided in 40 CFR 60.660(c). Certain distillation columns vent streams in the ethylene plant could potentially be routed to the boilers. Therefore 40 CFR 60, Subpart NNN is applicable.[2]

401 KAR 60:005 Section 2(2)(ttt), 40 C.F.R. 60.700 to 60.708 (Subpart RRR), Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes, applies to (1) each reactor process not discharging its vent stream into a recovery system, (2) each combination of a reactor process and the recovery system into which its vent stream is discharged, and (3) each combination of two or more reactor processes and the common recovery system into which their vent streams are discharged or which construction, modification, or reconstruction commenced after June 29, 1990 and that is part of a process unit that produces any of the chemicals listed in 40 CFR 60.707 as a product, co-product, by-product, or intermediate, except as provided in 40 CFR 60.700(c). The ethylene plant cracking furnaces vent streams could potentially be routed to the boilers. Therefore 40 CFR 60, Subpart RRR is applicable.[3]

401 KAR 63:002 Section 2(4)(iiii), 40 C.F.R. 63.7480 to 63.7575, Tables 1 to 13 (Subpart DDDDD), National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters, applies to industrial, commercial, or institutional boilers or process heaters as defined in 40 CFR 63.7575 that are located at, or are part of, a major source of hazardous air pollutants (HAP), except as specified in 40 CFR 63.7491. Boilers #2 and #6 are subject to 40 CFR 63, Subpart DDDDD.

Comments:

The Maximum Hourly Firing Rate of EPN 009 shall not exceed 210 mmBtu/hr on a 24-hour average basis and the Annual Average Firing Rate of EPN 009 shall not exceed 201.58 mmBtu/hr on a 12-month rolling basis

The Maximum Hourly Firing Rate of EPN 013 shall not exceed 210 mmBtu/hr on a 24-hour average basis and the Annual Average Firing Rate of EPN 013 shall not exceed 201.58 mmBtu/hr on a 12-month rolling basis.

[1] = Process fuel gas is natural gas in combination with any of the following: ethylene plant fuel gas, hydrogen, propane, ethane, recovered flare gas, and mixtures thereof.

Emission Units: 005 (EPN 009) Boiler #2, 013B (EPN 013) Boiler #6

[2] = Pursuant to 40 CFR 65.63(a)(2) as referenced by 40 CFR 60.660(d)(1) and 40 CFR 60.700(d)(1), the permittee must reduce emissions of regulated material or TOC by at least 98 weight-percent or to a concentration of less than 20 parts per million by volume, whichever is less stringent. For combustion devices, the emission reduction or concentration shall be calculated on a dry basis, and corrected to 3 percent oxygen. The permittee shall meet the requirements in 40 CFR 65.142(b) and 40 CFR 65.63(a)(2)(i) and/or 40 CFR 65.63(a)(2)(ii).

[3] = Utilizing clean, gaseous fuel: the permittee shall maintain records of the monthly consumption for each type of fuel component (natural gas, hydrogen, and process gas) used at each boiler, and the monthly average heat input rate of each fuel mixture in mmBtu/mmscf.

[4] = Proper design and operation; and conducting good combustion practices: the permittee shall keep records on file of the manufacturer's recommendations for:

(1) Calibrations on the excess oxygen analyzer as per the manufacturer's recommendations;
(2) Calibrations and filter checks on the fuel gas analyzer as per the manufacturer's recommendations;
(3) Calibration of the fuel gas flow meter as per the manufacturer's recommendations;
(4) Inspect the furnace, insulation, piping and refractory, and repair / replace components as per the manufacturer's recommendations;
(5) Operation of the boiler with a continuous automated oxygen trim system; and
(6) Conducting a tune-up of the boiler in accordance with 40 CFR 63.7540(a)(10)(i)-(iii) and 40 CFR 63.7540(a)(10)(vi)(B).

[5] = The following control technology, equipment and method are required to meet Best Available Control Technology (BACT) demonstration for Greenhouse Gasses (as CO_2e) emissions:

(1) Utilizing clean, gaseous fuel.
(2) Good heater design, including insulation and minimization of potential for air infiltration;
(3) Good combustion practices and proper burner design and operation;
(4) Condensate Recovery and Blowdown Heat Recovery;
(5) Thermal efficiency of the boiler shall be equal to or greater than 84% while burning natural gas; and
(6) Thermal efficiency of the boiler shall be equal to or greater than 78% while burning process fuel gas.

The permittee shall keep records on file of the manufacturer's recommendations for:

(i) Preventative maintenance of the boiler including calibration of fuel gas flow meters and oxygen control analyzers, cleaning of burner tips and cleaning of convection section tubes.
(ii) Operation of the boiler with a continuous automated oxygen trim system.
(iii) Conducting a tune-up of the boiler in accordance with 40 CFR 63.7540(a)(10)(i)-(iii) and 40 CFR 63.7540(a)(10)(vi)(B).

[6] = The permittee shall keep records of the thermal efficiency as provided by the manufacturer for each fuel burned; or records to demonstrate that the average monthly thermal efficiency of 84% has been maintained while burning natural gas and the average monthly thermal efficiency of 78% has been maintained while burning process fuel gas.

[7] = Performance Testing on Boiler #2 required by 40 CFR 60.44b(a)(1) resulted in a 30-day average emission factor of 0.037 lb/mmBtu. This was used for the equivalent Boiler #6.

[8] = NG = The use of natural gas only with a heat content of 1,000 Btu/scf. Emission factors have been multiplied by a ratio of 1,000 Btu/1,020 Btu to account for the use of default emission factors from AP-42 for natural gas.

[9] = $NG+H_2$ = The use of natural gas with hydrogen gas with a total heat content of 325 Btu/scf.

Emission Unit: 026 (EPN049) Equalization Tank

Initial Construction Date: 1986

Process Description:
026 (EPN 049) Equalization Tank (TK-1850)(EE-6)
1,500,000-gallon capacity
External Floating Roof

Applicable Regulation:
401 KAR 57:002, Section 2, 40 C.F.R. 61.340 to 61.359, Appendices A to E (Subpart FF), National Emission Standard for Benzene Waste Operations applies to a permittee of hazardous waste treatment, storage, and disposal facilities that treat, store, or dispose of hazardous waste generated by chemical manufacturing plants, coke by-product recovery plants, and petroleum refineries. The Equalization Tank is subject to the requirements of 40 CFR 61, Subpart FF.

401 KAR 63:020, Potentially hazardous matter or toxic substances [State-Origin Requirement], applies to each affected facility which emits or may emit potentially hazardous matter or toxic substances, provided that such emissions are not elsewhere subject to the provisions of the administrative regulations of the Division. This applies to the HAP emissions from the Equalization Tank (TK-1850).

Comments:
Pursuant to 40 CFR 61.351(a)(2), as an alternative to the standards for tanks specified in 40 CFR 61.343 of 40 CFR 61, Subpart FF, the permittee may elect to comply with an external floating roof meeting the requirements of 40 CFR 60.112b(a)(2).

Refer to (EPN ET-1) Ethylene Wastewater Pre-Treatment Plant and (FF-1) Plant-wide Uncontrolled Benzene Emissions located in Section B of the operating permit for Westlake Chemical OpCo, LP (AI 122899) for benzene waste stream requirements.

Emission Unit: 027 (EPN 052) Cooling Water Tower CT-3

Pollutant	Emission Limit or Standard	Regulatory Basis for Emission Limit or Standard	Emission Factor Used and Basis	Compliance Method
PM	2.58 lbs/hr	401 KAR 61:020 Section 3(2)(a)	0.1668 lb/mmgal[1] Reisman and Frisbie	Compliance assumed when mist eliminators are in place and properly maintained.[2]
	40% Opacity	401 KAR 61:020 Section 3(1)(a)	NA	

Initial Construction Date: 1959

Process Description:
027 (EPN 052) Cooling Water Tower CT-3
Recirculation Rate: 40,000 gallons,
Equipped with mist eliminator with 0.001% Drift Loss
Non-contact Cooling Tower

Emission Unit: 027 (EPN 052) Cooling Water Tower CT-3

Applicable Regulation:
401 KAR 61:020. Existing process operations applies to each affected facility or source, associated with a process operation, which is not subject to another emission standard with respect to particulates in 401 KAR 61, commenced before July 2, 1975. The No. 3 Cooling Water Tower was constructed before July 2, 1975 and is subject to the requirements of 401 KAR 61:020.

401 KAR 63:002 Section 2(4)(a), 40 C.F.R. 63.100 to 63.107, Tables 1 to 4 (Subpart F), National Emission Standards for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry, applies to chemical manufacturing process units that manufacture as a primary product one or more of the chemicals listed in table 1 of 40 CFR 63, Subpart F; or tetrahydrobenzaldehyde (CAS Number 100-50-5); or crotonaldehyde (CAS Number 123-73-9), use as a reactant or manufacture as a product, or co-product, one or more of the organic hazardous air pollutants listed in table 2 of 40 CFR 63, Subpart F, and are located at a plant site that is a major source as defined in section 112(a) of the Act. The No. 3 Cooling Water Tower is subject to the requirements of 40 CFR 63, Subpart F.

Precluded Regulations:
401 KAR 63:002, Section 2(4)(j), 40 C.F.R. 63.400 to 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.

Pursuant to 40 CFR 63.104(a), the Cooling Tower is in compliance with 40 CFR 63.104(a) by monitoring the cooling tower for indication of leaks in accordance with 40 CFR 63.104(b).

[1] = PM/PM10/PM2.5 EF from "Calculating Realistic PM10 Emissions from Cooling Towers," Abstract No. 216, Session No. AM-1b, Joel Reisman and Gordon Frisbie, Greystone Environmental Consultants, Inc., 4/11/2002

[2] =Mist Eliminator Manufacture Guarantee of 0.001% for EPN 052.

Emission Units: 032/033 (EPN 453/530) Oxy and Primary Thermal Incinerators (EPN 445) Contaminated Wastewater Storage Tank, (EPN 446) Stormwater Storage Tank

Initial Construction Date: EPN 445 – 1981; EPN 446 – 1985;

Process Description:
032/033 (EPN 453/530) Oxy and Primary Thermal Incinerators
The following are routed to either the Oxy Incinerator or Primary Thermal Incinerator in the Monomers Plant through a closed vent system.

(EPN 445) Contaminated Wastewater Storage Tank
1,200,000-gallon capacity
Fixed Roof

Emission Units: 032/033 (EPN 453/530) Oxy and Primary Thermal Incinerators (EPN 445) Contaminated Wastewater Storage Tank, (EPN 446) Stormwater Storage Tank

(EPN 446) Stormwater Storage Tank
1,200,000-gallon capacity
Fixed Roof

Applicable Regulation:
401 KAR 63:002, Section 2(4)(b), 40 C.F.R. 63.110 to 63.153, Tables 1 to 37, and Figure 1 (Subpart G), National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater applies to all process vents, storage vessels, transfer racks, wastewater streams, and in-process equipment subject to 40 CFR 63.149 within a source subject to 40 CFR 63, Subpart F. The Contaminated Wastewater and Storm water Storage Tanks are subject to the requirements of 40 CFR 63, Subpart G.

Comments:
40 CFR 63.133, Process wastewater provisions for wastewater tanks are not applicable pursuant to 40 CFR 63.149(c), the item of equipment is part of a chemical manufacturing process unit that meets the criteria of 40 CFR 63.100(b).

Pursuant to table 35 of 40 CFR 63, Subpart G, the permittee shall maintain a fixed roof on tanks with capacities of 38 m^3 or greater. If the tank is sparged or used for heating or treating by means of an exothermic reaction, a fixed roof and a system shall be maintained that routes the organic hazardous air pollutants vapors to other process equipment or a fuel gas system, or a closed vent system that routes vapors to a control device that meets the requirements of 40 CFR 63.119(e)(1) or (e)(2).

Emission Unit: 032/033 (EPN 453/530) Oxy and Primary Thermal Incinerators (EPN EE-4) EDC Recovery Column

Initial Construction Date: 1979

Process Description:
EU# 032 (EPN EE-4) EDC Recovery Column
The EDC Recovery Columns recover VOCs, primarily Ethylene Dichloride and Vinyl Chloride, from process wastewater streams.
Control: EPN 453 or EPN 530 for organic HAPs

Applicable Regulation:
401 KAR 63:002, Section 2(4)(b), 40 C.F.R. 63.110 to 63.153, Tables 1 to 37, and Figure 1 (Subpart G), National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater applies to all process vents, storage vessels, transfer racks, wastewater streams, and in-process equipment subject to 40 CFR 63.149 within a source subject to 40 CFR 63, Subpart F. The EDC Recovery Columns are subject to the requirements of 40 CFR 63, Subpart G.

Emission Unit: 032/033 (EPN 453/530) Oxy and Primary Thermal Incinerators (EPN EE-4) EDC Recovery Column

Comments:
The group status of the wastewater streams is Group 2 as of the issuance of permit V-19-016.

Pursuant to 40 CFR 63.132(a)(3), for wastewater streams that are Group 2 for table 9 compounds in 40 CFR 63, Subpart G, the permittee shall comply with the applicable recordkeeping and reporting requirements specified in 40 CFR 63.146(b)(1) and 63.147(b)(8).

Emission Unit: 028 (EPN EE-5) Activated Sludge Biotreatment System/ Secondary Wastewater Treatment System

Initial Construction Date: 1979

Process Description:
028 (EPN EE-5) Activated Sludge Biotreatment/Secondary Wastewater Treatment System
The secondary water treatment system consists of a primary clarifier, EQ tank, biotreater, secondary clarifier, and a sludge biotreater.

Applicable Regulation:
401 KAR 57:002, Section 2, 40 C.F.R. 61.340 to 61.359, Appendices A to E (Subpart FF), National emission standard for benzene waste operations applies to a permittee of hazardous waste treatment, storage, and disposal facilities that treat, store, or dispose of hazardous waste generated by chemical manufacturing plants, coke by-product recovery plants, and petroleum refineries. The Activated Sludge Biotreatment System/Secondary Wastewater Treatment System is subject to the requirements of 40 CFR 61, Subpart FF.

401 KAR 63:020, Potentially hazardous matter or toxic substances [State-Origin Requirement], applies to each affected facility which emits or may emit potentially hazardous matter or toxic substances, provided that such emissions are not elsewhere subject to the provisions of the administrative regulations of the Division. This applies to the HAP emissions from EPN EE-5.

Comments:
Refer to (EPN ET-1) Ethylene Wastewater Pre-Treatment Plant and (FF-1) Plant-wide Uncontrolled Benzene Emissions located in Section B of the operating permit for Westlake Chemical OpCo, LP (AI 122899) for benzene waste stream requirements.

Pursuant to 40 CFR 61.348(g), compliance with 40 CFR 61, Subpart FF will be determined by review of the facility records and results from tests and inspections using the methods and procedures specified in 40 CFR 61.355.

Emission Units: 029 (EPN 407) Catoxid Reactor Startup Vent, CAP (EPN 437) Catoxid Air Preheater

Pollutant	Emission Limit or Standard	Regulatory Basis for Emission Limit or Standard	Emission Factor Used and Basis	Compliance Method
SO_2 (EPN 437)	0.8 lb/mmBtu	401 KAR 59:015, Section 5(1)(b)(1)	0.6 lb/mmscf (AP-42 1.4)	Burning gaseous fuel as defined in 40 CFR 63.7575.

Emission Units: 029 (EPN 407) Catoxid Reactor Startup Vent, CAP (EPN 437) Catoxid Air Preheater				
PM (EPN 437)	0.10 lb/mmBtu	401 KAR59:015, Section 4(1)(b)	7.6 lb/mmscf (AP-42 1.4)	Burning gaseous fuel as defined in 40 CFR 63.7575.
Opacity[2] (EPN 437)	20%	401 KAR 59:015, Section 4(2)	NA	

Initial Construction Date: EPN 407 – 1974; EPN 437 – 1973;

Process Description:
029 (EPN 407) Catoxid Reactor Startup Vent
Control: Scrubber
Emissions: Catoxid reactor exhaust is released during startup.

CAP (EPN 437) Catoxid Air Preheater
Maximum Operating Rate: 8.70 mmBtu/hr
Fuel: Process fuel gas[1]
Control: None

Applicable Regulation:
401 KAR 59:015, New Indirect Heat Exchangers, applies to the particulate matter and sulfur dioxide emissions for each indirect heat exchanger commenced on or after April 9, 1972 with a heat input capacity at or below 250 mmBtu/hour, and more than one (1) mmBtu/hour. The Catoxid Air Preheater (EPN 437) is subject to the requirements of 401 KAR 59:015.

401 KAR 63:002 Section 2(4)(iiii), 40 C.F.R. 63.7480 to 63.7575, Tables 1 to 13 (Subpart DDDDD), National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters, applies to industrial, commercial, or institutional boilers or process heaters as defined in 40 CFR 63.7575 that are located at, or are part of, a major source of hazardous air pollutants (HAP), except as specified in 40 CFR 63.7491. The Catoxid Air Preheater (EPN 437) is subject to the requirements of 40 CFR 63, Subpart DDDDD.

Comments:
The permittee shall operate the Catoxid Vent Scrubber at all times the Catoxid Startup Vent is used.

[1] = Process fuel gas includes natural gas, ethylene plant fuel gas, hydrogen, propane, ethane, recovered flare gas, and mixtures thereof.

[2] = The Energy Assessment for EPN 437 as required by Item 4 of Table 3 to 40 CFR 63, Subpart DDDDD was conducted on February 25, 2020.

Emission Unit: 030 (EPN 438) No. 1 EDC Shore Tank/ Alternate Vacuum Feed Tank, (EPN 454) No. 5 EDC Shore Tank, (EPN 455) No. 6 EDC Shore Tank

Initial Construction Date: EPN 438 – 1980; EPN 454 – 1978; EPN 455 – 1978;

Process Description:
030 (EPN 438)/(EPN 454)/(EPN 455)

Emission Unit: 030
(EPN 438) No. 1 EDC Shore Tank/ Alternate Vacuum Feed Tank,
(EPN 454) No. 5 EDC Shore Tank, (EPN 455) No. 6 EDC Shore Tank

(EPN 438) No. 1 EDC Shore Tank/ Alternate Vacuum Feed Tank
599,466-gallon capacity
Internal Floating Roof
Maximum Vapor Pressure: 1.23 pounds per square inch (psi)

(EPN 454)No. 5 EDC Shore Tank
1,387,000-gallon capacity
Internal Floating Roof
Maximum Vapor Pressure: 1.23 psi

(EPN **455) No. 6 EDC Shore Tank**
1,387,000-gallon capacity
Internal Floating Roof
Maximum Vapor Pressure: 1.23 psi

Applicable Regulation:
401 KAR 63:002, Section 2(4)(b), 40 C.F.R. 63.110 to 63.153, Tables 1 to 37, and Figure 1 (Subpart G), National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater applies to all process vents, storage vessels, transfer racks, wastewater streams, and in-process equipment subject to 40 CFR 63.149 within a source subject to 40 CFR 63, Subpart F. The No. 1, No. 5, and No. 6 Shore Tanks are subject to the requirements of 40 CFR 63, Subpart G.

Non-Applicable Regulations:
401 KAR 60:005, Section 2(2)(q), 40 C.F.R. 60.110a to 60.115a (Subpart Ka), Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984 applies to each storage vessel with a storage capacity greater than 151,416 liters (40,000 gallons) that is used to store petroleum liquids for which construction is commenced after May 18, 1978. The shore tanks store ethylene dichloride which is not a petroleum liquid. Therefore, 40 CFR 60, Subpart Ka is not applicable.

401 KAR 60:005, Section 2(2)(r), 40 C.F.R. 60.110b to 60.117b (Subpart Kb), Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984 applies to each storage vessel with a capacity greater than or equal to 75 cubic meters (m^3) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984. The storage tanks were constructed prior to July 23, 1984, therefore 40 CFR 60, Subpart Kb is not applicable.

Comments:
The group status of the storage vessels are Group 1 as of the issuance of permit V-19-016.

Pursuant to 40 CFR 63.119(a)(1), for each Group 1 storage vessel storing a liquid for which the maximum true vapor pressure of the total organic hazardous air pollutants in the liquid is less than 11.11 psi, the permittee shall reduce hazardous air pollutants emissions to the atmosphere by operating and maintaining a fixed roof and internal floating roof, in accordance with the requirements in 40 CFR 63.119(b).

Emission Units: 032/033 (EPN 453/530) Oxy and Primary Thermal Incinerators (EPN 439) No. 2 EDC Shore Tank, (EPN 609) EDC Truck Loading, (EPN 734) No. 7 EDC Shore Tank, (EPN 735) No. 8 EDC Shore Tank, (EPN 736) No. 9 EDC Shore Tank, (EPN TK-30-B2) Light Ends Tanks

Pollutant	Emission Limit or Standard	Regulatory Basis for Emission Limit or Standard	Emission Factor Used and Basis	Compliance Method
Total Organic Hazardous air pollutants	Reduce inlet Emissions by 95%	40 CFR 63.119(e)(1)	NA	Vented to monitored control device

Initial Construction and/or Modification Date: EPN 439 – 1980; EPN 609 – 2014; EPN 734 – 1990; EPN 735 – 1992; EPN 736 – 1994; EPN TK-30-B2 – 1978 (2004[1])

Process Description:
032/033 (EPN 453/530) Oxy and Primary Thermal Incinerators
The following are routed to either the Oxy Incinerator or Primary Thermal Incinerator in the Monomers Plant through a closed vent system.

(EPN 439) No. 2 EDC Shore Tank
599,458-gallon capacity
Fixed Roof

(EPN 609) EDC Truck Loading
52 Trucks/year @ 208,000 gallons each

(EPN 734) No. 7 EDC Shore Tank
1,325,825-gallon capacity
Fixed Roof

(EPN 735) No. 8 EDC Shore Tank
1,325,825-gallon capacity
Fixed Roof

(EPN 736) No. 9 EDC Shore Tank
1,325,825-gallon capacity
Fixed Roof

(EPN TK-30-B2) Light Ends Tank
100,000-gallon capacity
Fixed Roof

Applicable Regulation:
401 KAR 60:005, Section 2(2)(r), 40 C.F.R. 60.110b to 60.117b (Subpart Kb), Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984 applies to each storage vessel with a capacity greater than or equal to 75 cubic meters (m^3) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984. 40 CFR 60, Subpart Kb is applicable to (EPN 734) No. 7 EDC Shore Tank, (EPN 735) No. 8 EDC Shore Tank, and (EPN 736) No. 9 EDC Shore Tank.

401 KAR 63:002 Section 2(4)(b), 40 C.F.R. 63.110 to 63.153, Tables 1 to 37, and Figure 1 (Subpart G), National Emission Standards for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater.

Emission Units: 032/033 (EPN 453/530) Oxy and Primary Thermal Incinerators (EPN 439) No. 2 EDC Shore Tank, (EPN 609) EDC Truck Loading, (EPN 734) No. 7 EDC Shore Tank, (EPN 735) No. 8 EDC Shore Tank, (EPN 736) No. 9 EDC Shore Tank, (EPN TK-30-B2) Light Ends Tanks

Comments:

[1]= Not a modification as defined in 40 CFR 63 & 40 CFR 60. Since the Light Ends Tank (EPN TK-30-B2) modification does not meet the definition of a modification pursuant to 40 CFR Chapters 60 or 63, 40 CFR 60, Subpart Kb does not apply since the initial construction date of the tank was 1978.

The group status of the storage vessels are Group 1 as of the issuance of permit V-19-016.

Pursuant to 40 CFR 63.110(b)(1), Overlap with other regulations for storage vessels, after the compliance dates specified in 40 CFR 63.100 of 40 CFR 63, Subpart F, a Group 1 or Group 2 storage vessel that is also subject to the provisions of 40 CFR 60, Subpart Kb is required to comply only with the provisions of 40 CFR 63, Subpart G.

Emission Unit: 039(EPN 410) South Synthesis Solvesso Tank

Initial Construction Date: 2004 (Converted to a Solvesso Storage Tank)

Process Description:
Former Strip out tank moved to replace EPN 410 and EPN 411 (8/8/2007 Minor Revision)
10,575-gallon capacity
Fixed Roof
Maximum Vapor Pressure: 0.0026 psi

Applicable Regulation:
401 KAR 63:002, Section 2(4)(b), 40 C.F.R. 63.110 to 63.153, Tables 1 to 37, and Figure 1 (Subpart G), National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater applies to all process vents, storage vessels, transfer racks, wastewater streams, and in-process equipment subject to 40 CFR 63.149 within a source subject to 40 CFR 63, Subpart F. 40 CFR 63, Subpart G is applicable to the Solvesso Tank.

Comments:
The group status of the storage vessel is Group 1 as of the issuance of permit V-19-016.

Emission Units: 032/033 (EPN 453/530) Oxy and Primary Thermal Incinerators (EPN 441) North/South Cracking Sump Tank, (EPN 442) East Cracking Sump Tank

Initial Construction Date: EPN 441 – 1979; EPN 442 – 1979;

Process Description:
032/033 (EPN 453/530) Oxy and Primary Thermal Incinerators
The following are routed to either the Oxy Incinerator or Primary Thermal Incinerator in the Monomers Plant through a closed vent system.

Emission Units: 032/033 (EPN 453/530) Oxy and Primary Thermal Incinerators (EPN 441) North/South Cracking Sump Tank, (EPN 442) East Cracking Sump Tank	
(EPN 441) **North/South Cracking Sump Tank** 3,000-gallon capacity Fixed Roof	**(EPN 442)** **East Cracking Sump Tank** 3,000-gallon capacity Fixed Roof

Applicable Regulation:
401 KAR 63:002 Section 2(4)(a), 40 C.F.R. 63.100 to 63.107, Tables 1 to 4 (Subpart F), National Emission Standards for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry, applies to chemical manufacturing process units that manufacture as a primary product one or more of the chemicals listed in table 1 of 40 CFR 63, Subpart F; or tetrahydrobenzaldehyde (CAS Number 100-50-5); or crotonaldehyde (CAS Number 123-73-9), use as a reactant or manufacture as a product, or co-product, one or more of the organic hazardous air pollutants listed in table 2 of 40 CFR 63, Subpart F, and are located at a plant site that is a major source as defined in section 112(a) of the Act. The North/South Cracking Sump Tank and East Cracking Sump Tank are subject to the requirements of 40 CFR 63, Subpart F.

Non-Applicable Regulations:
401 KAR 63:002, Section 2(4)(b), 40 C.F.R. 63.110 to 63.153, Tables 1 to 37, and Figure 1 (Subpart G), National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater applies to all process vents, storage vessels, transfer racks, wastewater streams, and in-process equipment subject to 40 CFR 63.149 within a source subject to 40 CFR 63, Subpart F. 40 CFR 63, Subpart G is not applicable to the North/South Cracking and East Cracking Sump Tanks.

Comments:
The North/South Cracking and East Cracking Sump Tanks are each 3,000 gallons in capacity. Pursuant to 40 CFR 63.149(a), the permittee shall comply with the provisions of table 35 of 40 CFR 63, Subpart G for each item of equipment meeting all the criteria specified in 40 CFR 63.149(b) through (d) and either 40 CFR 63.149(e)(1) or (e)(2). Pursuant to 40 CFR 63.149(b), the item of equipment is of a type identified in table 35 of 40 CFR 63, Subpart G. However, footnote c to table 35 of 40 CFR 63, Subpart G, states that tanks listed in table 35 of 40 CFR 63, Subpart G applies to tanks with capacities of 38 m^3 (10,038.5 gallons) or greater. Therefore the North/South Cracking and East Cracking Sump Tanks are not an item listed in table 35, and thus 40 CFR 63, Subpart G is not applicable.

Emission Unit: 031 (EPN 449) South Synthesis EDC Absorber (High Point Vent)				
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis**	**Compliance Method**
[1]Vinyl Chloride (VCl)	0.02 lb/100 lb of EDC on a 3-hour rolling average	40 CFR 61.62(b)	576.9 lb/ton (Engineering Estimates)	Operate the absorber at all times and conduct a performance test on the absorber every 5 years.

Emission Unit: 031 (EPN 449) South Synthesis EDC Absorber (High Point Vent)

Initial Construction Date: 1982

Process Description:

031 (EPN 449) South Synthesis EDC Absorber (High Point Vent)

The South Synthesis Absorber recovers EDC and other organics from the vents to the Oxychlorination reactor off gases before being vented to the atmosphere, rendering the vent a HON Group 2 process vent. The requirements below only apply during times in which the Absorber vent is vented to the atmosphere directly after the South Synthesis Absorber, instead of going to the Oxy Incinerator (453) or the Primary Thermal Incinerator (530).

Applicable Regulation:

401 KAR 63:002 Section 2(4)(b), 40 C.F.R. 63.110 to 63.153, Tables 1 to 37, and Figure 1 (Subpart G), National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater. 40 CFR 63, Subpart G is applicable to South Synthesis EDC Absorber.

Comments:

[1]= Pursuant to 401 KAR 52:020, Section 10, during times in which the absorber vent is vented directly to the atmosphere, the process vent shall be controlled by the South Synthesis Absorber such that the process vent is maintained as a Group 2 process vent pursuant to 40 CFR 63.113(d).

* The Solvesso Recovery System Outlet Process Vent is a Group 2 process vent under the HON that meets the following conditions:

(1) Flow rate greater than or equal to 0.005 standard cubic meter per minute;
(2) HAP concentration greater than or equal to 50 parts per million by volume; and,
(3) Total Resource Effectiveness (TRE) value of 1.0 but less than or equal to 4.0.

* The TRE does not have to be recalculated unless there is a process change [40 CFR 63.115(e)]. On 1/17 - 18/2019, the TRE Index was calculated to be 1.57 while the CO_2 Stripper was vented away from the Absorber System and 1.40 while the CO_2 Stripper was vented to the Absorber System. Therefore, the Vent is classified as a Group 2 process vent.

Emission Units: 032/033 (EPN 453/530) Oxy and Primary Thermal Incinerators

Pollutant	Emission Limit or Standard	Regulatory Basis for Emission Limit or Standard	Emission Factor Used and Basis	Compliance Method
[a] Total Organic Hazardous air Pollutant	Reduce by 98% or 20 ppmv (dry basis, corrected to 3% O_2)	40 CFR 63.113(a)(2)	NA	Operate controls at all times and conduct a performance test using the procedures specified in 40 CFR 63.116 every 5 years.
[a] Hydrogen Halides and Halogens	(EPN 453) - Reduced by 95% or ≤ 0.45 kg/hr	40 CFR 63.113(c)(1)(ii)	NA	Operate controls at all times and test as specified in 40 CFR 63.116(d) every 5 years.
[a] Hydrogen Halides and Halogens	(EPN 530) – Reduced by 99% or ≤ 0.45 kg/hr	40 CFR 63.113(c)(1)(i)	NA	Operate controls at all times and test as specified in 40 CFR 63.116(d) every 5 years.

Emission Units: 032/033 (EPN 453/530) Oxy and Primary Thermal Incinerators

Initial Construction and/or Modification Date: EPN 453 – 1982; EPN 530 – 1977 (2015 - New Scrubber);

Process Description:

032 (EPN 453) Oxy Incinerator

Capacity: 75.6 mmBtu/hr
Fuel: Process fuel gas [1]
Emissions: Process gas, waste gas, and natural gas combustion emissions
Controls: Packed wet scrubber following incinerator for acid gas

033 (EPN 530) Primary Thermal Incinerator

Capacity: 60.0 mmBtu/hr
Fuel: Process fuel gas [1]
Emissions: Process gas, waste gas, and natural gas combustion emissions
Controls: Quench, absorber, and packed wet scrubber following incinerator for acid gas

In addition to the process vent gas, the following emission units may be vented to either the Oxy Incinerator (EPN 453) and/or the Primary Thermal Incinerator (EPN 530):

From Westlake Vinyls, Inc. – Vinyls Plant Monomers Plant:
No. 2 EDC Shore Tank (439)
No. 7 EDC Shore Tank (734)
No. 8 EDC Shore Tank (735)
No. 9 EDC Shore Tank (736)
Light Ends Tank (TK-30-B2)

From Westlake Vinyls, Inc. – Vinyls Plant Energy and Environmental Operations:
Contaminated Water Storage Tank (445)
Storm water Storage Tank (446)
A and B EDC Recovery Columns (EE-4)

Sources from Avient Corporation/Goodrich Corporation:
Bioventing Operation
C Stripper in Groundwater Stripping System

All vent gases are routed to the incinerators via the following vent headers:

Dry EDC Vent Header	Dry VCM Vent Header
Wet EDC Vent Header	Wet VCM Vent Header
Depressuring Header	Vacuum Vent Header (No. 7 Vent Header)
EDC Absorber Vent Header	HTDC/LTC/Product Column Vent Header*

* (only connected to the Oxy Incinerator)

Applicable Regulation:
401 KAR 57:002, Section 2, 40 C.F.R. 61.60 to 61.71, (Subpart F), National Emission Standard for Vinyl Chloride applies to plants which produce (1) ethylene dichloride by reaction of oxygen and hydrogen chloride with ethylene, (2) vinyl chloride by any process, and/or (3) one or more polymers containing any fraction of polymerized vinyl chloride. 40 CFR 61, Subpart F, applies to the Oxy Incinerator (EPN 453) and the Primary Thermal Incinerator (EPN 530). However, pursuant to 40 CFR 63.110(f)(1), After the compliance dates specified in 40 CFR 63.100, the permittee of any Group 1 process vent that is also subject to the provisions of 40 CFR 61, Subpart F shall comply only with the provisions of 40 CFR 63, Subpart G.

Emission Units: 032/033 (EPN 453/530) Oxy and Primary Thermal Incinerators

401 KAR 60:005 Section 2(2)(ppp), 40 C.F.R. 60.660 to 60.668 (Subpart NNN), Standards of Performance for Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations, applies to (1) each distillation unit not discharging its vent stream into a recovery system, each combination of a distillation unit and the recovery system into which its vent stream is discharged, and (3) each combination of two or more distillation units and the common recovery system into which their vent streams are discharged that is part of a process unit that produces any of the chemicals listed in 40 CFR 60.667 as a product, co-product, by-product, or intermediate, except as provided in 40 CFR 60.660(c). Certain distillation columns vent streams in the ethylene plant could potentially be routed to the incinerators. Therefore 40 CFR 60, Subpart NNN is applicable.[2]

401 KAR 60:005 Section 2(2)(ttt), 40 C.F.R. 60.700 to 60.708 (Subpart RRR), Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes, applies to (1) each reactor process not discharging its vent stream into a recovery system, (2) each combination of a reactor process and the recovery system into which its vent stream is discharged, and (3) each combination of two or more reactor processes and the common recovery system into which their vent streams are discharged or which construction, modification, or reconstruction commenced after June 29, 1990 and that is part of a process unit that produces any of the chemicals listed in 40 CFR 60.707 as a product, co-product, by-product, or intermediate, except as provided in 40 CFR 60.700(c). The ethylene plant cracking furnaces vent streams could potentially be routed to the incinerators. Therefore 40 CFR 60, Subpart RRR is applicable.[2]

401 KAR 63:002, Section 2(4)(b), 40 C.F.R. 63.110 to 63.153, Tables 1 to 37, and Figure 1 (Subpart G), National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater applies to all process vents, storage vessels, transfer racks, wastewater streams, and in-process equipment subject to 40 CFR 63.149 within a source subject to 40 CFR 63, Subpart F. 40 CFR 63, Subpart G is applicable to the Oxy and Primary Thermal Incinerators.

401 KAR 63:020, Potentially hazardous matter or toxic substances [State-Origin Requirement], applies to each affected facility which emits or may emit potentially hazardous matter or toxic substances, provided that such emissions are not elsewhere subject to the provisions of the administrative regulations of the Division. This applies to the inorganic HAP emissions from the Oxy and Primary Thermal Incinerators (EPN 453 and 530)

Comments:

[a] = Pursuant to 40 CFR 63.113(a)(2) and (c)(1)(ii), the less stringent reduction shall be met.

[1] = Process fuel gas includes natural gas, ethylene plant fuel gas, hydrogen, propane, ethane, recovered flare gas, and mixtures thereof.

[2] = Pursuant to 40 CFR 65.63(a)(2) as referenced by 40 CFR 60.660(d)(1) and 40 CFR 60.700(d)(1), the permittee must reduce emissions of regulated material or TOC by at least 98 weight-percent or to a concentration of less than 20 parts per million by volume, whichever is less stringent. For combustion devices, the emission reduction or concentration shall be calculated on a dry basis, and corrected to 3 percent oxygen. The permittee shall meet the requirements in 40 CFR 65.142(b) and 40 CFR 65.63(a)(2)(i) and/or 40 CFR 65.63(a)(2)(ii).

Emission Units: 010 (EPN 514) South Cracking Furnace #13, 011 (EPN 526) North Cracking Furnace 1A; (EPN 527) North Cracking Furnace 2A 012D (EPN 534A) EDC Cracking Furnace #3A, 012B (EPN 535) EDC Cracking Furnace #4, 012C (EPN 536) EDC Cracking Furnace #5				
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis (lb/mmscf)**	**Compliance Method**
SO_2	0.8 lb/mmBtu	401 KAR 59:015, Section 5(1)(b)	0.6 (AP-42 1.4-1)	Burning gaseous fuel as defined in 40 CFR 63.7575.
PM	0.10 lb/mmBtu	401 KAR 59:015, Section 4(1)(b)	010: 11.22 [a] 011: 7.14 [a] 012D, 012C, 012B: 5.1 [a]	Burning gaseous fuel as defined in 40 CFR 63.7575.
PM	20% Opacity	401 KAR 59:015, Section 4(2)	NA	Burning gaseous fuel as defined in 40 CFR 63.7575.
For Emission Unit 012D (EPN 534A)				
CO	0.039 lb/mmBtu; 18.22 tpy, 12-month rolling basis	401 KAR 51:017, Section 8	39.78 (Manufacturer)	(BACT) Clean, gaseous fuel;[4] Proper design and operation;[5] Conducting good combustion practices.[5]
PM, PM_{10}, $PM_{2.5}$	0.005 lb/mmBtu; 2.34 tpy, 12-month rolling basis		5.1 (Manufacturer)	
VOC	0.0054 lb/mmBtu; 2.52 tpy, 12-month rolling basis		5.5 (AP-42 Ch.1.4)	See Compliance for CO and PM BACT.
CO_2e	54,920 tpy, 12-month rolling basis		119,797.45 (40 CFR 98, Subpart C)	(BACT) See Comments[6]
NOx	0.033 lb/mmBtu	401 KAR 52:020, Section 10	33.66 (Manufacturer)	Low NOx Burners

Initial Construction and/or Modification Date: 010 (EPN 514) – 1973 (2015[c]); 011 (EPN 526) – 1981 (2015[c]); 011 (EPN 527) – 1981 (2015[c]); 012D (EPN 534A) – Proposed 2023; 012B (EPN 535) – 1995 (2023[c]); 012C (EPN 536) – 2014;

Process Description:

010 (EPN 514) South Cracking Furnace #13
Rating: 60.0 mmBtu/hr
Fuel: Process fuel gas[1]
Controls: None

011 (EPN 526) North Cracking Furnace 1A
Rating: 56.0 mmBtu/hr
Fuel: Process fuel gas[1]
Controls: None

011 (EPN 527) North Cracking Furnace 2A
Rating: 56.0 mmBtu/hr
Fuel: Process fuel gas[1]
Controls: None

012D (EPN 534A) EDC Cracking Furnace #3A (Replacement Unit)[7]
Rating: 106.68 mmBtu/hr
Fuel: Process fuel gas[1]
Controls: None

**Emission Units: 010 (EPN 514) South Cracking Furnace #13,
011 (EPN 526) North Cracking Furnace 1A; (EPN 527) North Cracking Furnace 2A
012D (EPN 534A) EDC Cracking Furnace #3A,
012B (EPN 535) EDC Cracking Furnace #4, 012C (EPN 536) EDC Cracking Furnace #5**

012B (EPN 535) EDC Cracking Furnace #4	**012C (EPN 536) EDC Cracking Furnace #5**
Rating: 106.68 mmBtu/hr	Rating: 106.68 mmBtu/hr
Fuel: Process fuel gas[1]	Fuel: Process fuel gas[1]
Controls: None	Controls: None

Applicable Regulation:

401 KAR 51:017, Prevention of Significant Deterioration of Air Quality applies to the construction of a new major stationary source or a project at an existing major stationary source that commences construction after September 22, 1982, and locates in an area designated attainment or unclassifiable under 42 U.S.C. 7407(d)(1)(A)(ii) and (iii). Westlake Vinyls, Inc. – Vinyls Plant is a major source pursuant to Prevention of Significant Deterioration of Air Quality (PSD) and is subject to the requirements of PSD for 012D (EPN 534A).

401 KAR 59:015, New Indirect Heat Exchangers applies to the particulate matter and sulfur dioxide emissions for each indirect heat exchanger commenced on or after April 9, 1972 with a heat input capacity at or below 250 mmBtu/hour, and more than one (1) mmBtu/hour. Each cracking furnace is subject to the requirements of 401 KAR 59:015.

401 KAR 60:005 Section 2(2)(ppp), 40 C.F.R. 60.660 to 60.668 (Subpart NNN), Standards of Performance for Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations, applies to (1) each distillation unit not discharging its vent stream into a recovery system, each combination of a distillation unit and the recovery system into which its vent stream is discharged, and (3) each combination of two or more distillation units and the common recovery system into which their vent streams are discharged that is part of a process unit that produces any of the chemicals listed in 40 CFR 60.667 as a product, co-product, by-product, or intermediate, except as provided in 40 CFR 60.660(c). Certain distillation columns vent streams in the ethylene plant could potentially be routed to the cracking furnaces. Therefore 40 CFR 60, Subpart NNN is applicable.[2]

401 KAR 60:005 Section 2(2)(ttt), 40 C.F.R. 60.700 to 60.708 (Subpart RRR), Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes, applies to (1) each reactor process not discharging its vent stream into a recovery system, (2) each combination of a reactor process and the recovery system into which its vent stream is discharged, and (3) each combination of two or more reactor processes and the common recovery system into which their vent streams are discharged or which construction, modification, or reconstruction commenced after June 29, 1990 and that is part of a process unit that produces any of the chemicals listed in 40 CFR 60.707 as a product, co-product, by-product, or intermediate, except as provided in 40 CFR 60.700(c). The ethylene plant cracking furnaces vent streams could potentially be routed to the monomers cracking furnaces. Therefore 40 CFR 60, Subpart RRR is applicable.[2]

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

**Emission Units: 010 (EPN 514) South Cracking Furnace #13,
011 (EPN 526) North Cracking Furnace 1A; (EPN 527) North Cracking Furnace 2A
012D (EPN 534A) EDC Cracking Furnace #3A,
012B (EPN 535) EDC Cracking Furnace #4, 012C (EPN 536) EDC Cracking Furnace #5**

commercial, or institutional boilers or process heaters as defined in 40 CFR 63.7575 that are located at, or are part of, a major source of hazardous air pollutants (HAP), except as specified in 40 CFR 63.7491. The cracking furnaces are subject to the requirements of 40 CFR 63, Subpart DDDDD.[3]

Non-Applicable Regulations:
401 KAR 60:005 Section 2(2)(a), 40 C.F.R. 60.40 to 60.46 (Subpart D), Standards of Performance for Fossil-Fuel-Fired Steam Generators applies to each fossil-fuel-fired steam generating unit of more than 73 megawatts (MW) heat input rate (250 mmBtu/hr) and each fossil-fuel and wood-residue-fired steam generating unit capable of firing fossil fuel at a heat input rate of more than 73 MW (250 mmBtu/hr). The cracking furnaces are not steam generating units that produce more than 250 mmBtu/hr of steam, nor do they burn fossil fuel or wood-residue. Therefore, they are not subject to 40 CFR 60, Subpart D.

401 KAR 60:005 Section 2(2)(b), 40 C.F.R. 60.40Da to 60.52Da (Subpart Da), Standards of Performance for Electric Utility Steam Generating Units applies to each electric utility steam generating unit that is capable of combusting more than 73 megawatts (MW) (250 mmBtu/hr) heat input of fossil fuel (either alone or in combination with any other fuel); and for which construction, modification, or reconstruction is commenced after September 18, 1978. The cracking furnaces are not steam generating units that produce more than 250 mmBtu/hr of steam, nor do they burn fossil fuel (either alone or in combination with any other fuel). Therefore, they are not subject to 40 CFR 60, Subpart D.

401 KAR 60:005 Section 2(2)(c), 40 C.F.R. 60.40b to 60.49b (Subpart Db), Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units, applies to each steam generating unit that commences construction, modification, or reconstruction after June 19, 1984, and that has a heat input capacity from fuels combusted in the steam generating unit of greater than 100 mmBtu/hr. The cracking furnaces are not steam generating units and are not subject to 40 CFR 60, Subpart Db.

401 KAR 60:005 Section 2(2)(d), 40 C.F.R. 60.40c to 60.48c (Subpart Dc), Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units applies to each steam generating unit for which construction, modification, or reconstruction is commenced after June 9, 1989 and that has a maximum design heat input capacity of 29 megawatts (MW) (100 mmBtu/hr) or less, but greater than or equal to 2.9 MW (10 mmBtu/h). The cracking furnaces are not steam generating units and are not subject to 40 CFR 60, Subpart Dc.

Comments:
The Maximum Hourly Firing Rate of EPN 514 shall not exceed 66.0 mmBtu/hr on a 24-hour average basis and the Annual Average Firing Rate of EPN 514 shall not exceed 60.0 mmBtu/hr on 12-month rolling basis.

**Emission Units: 010 (EPN 514) South Cracking Furnace #13,
011 (EPN 526) North Cracking Furnace 1A; (EPN 527) North Cracking Furnace 2A
012D (EPN 534A) EDC Cracking Furnace #3A,
012B (EPN 535) EDC Cracking Furnace #4, 012C (EPN 536) EDC Cracking Furnace #5**

The Maximum Hourly Firing Rate of EPN 526 and EPN 527 shall not exceed 65.0 mmBtu/hr each on a 24-hour average basis and the Annual Average Firing Rate of EPN 526 and EPN 527 shall not exceed 56.0 mmBtu/hr each on 12-month rolling basis.

The Maximum Hourly Firing Rate and Annual Average Firing Rate of EPN 534A shall not exceed 106.68 mmBtu/hr on a 24-hour average basis and 12-month rolling basis.

The Maximum Hourly Firing Rate of EPN 535 and EPN 536 shall not exceed 115.0 mmBtu/hr each on a 24-hour average basis and the Annual Average Firing Rate of EPN 535 and EPN 536 shall not exceed 106.68 mmBtu/hr each on 12-month rolling basis.

[a] = Emission factor from Zeeco Burner.
[b] = Emission factor from AP-42 Chapter 1.4.
[c] = Low NO_x Burners Installed
[1] = Process fuel gas includes natural gas, ethylene plant fuel gas, hydrogen, propane, ethane, recovered flare gas, and mixtures thereof.
[2] = Pursuant to 40 CFR 65.63(a)(2) as referenced by 40 CFR 60.660(d)(1) and 40 CFR 60.700(d)(1), the permittee must reduce emissions of regulated material or TOC by at least 98 weight-percent or to a concentration of less than 20 parts per million by volume, whichever is less stringent. For combustion devices, the emission reduction or concentration shall be calculated on a dry basis and corrected to 3 percent oxygen. The permittee shall meet the requirements in 40 CFR 65.142(b) and 40 CFR 65.63(a)(2)(i) and/or 40 CFR 65.63(a)(2)(ii).
[3] = Pursuant to 40 CFR 63.7500(a)(1), the permittee must meet each emission limit and work practice standard in Tables 1 through 3, and 11 through 13 to 40 CFR 63, Subpart DDDDD that applies, for each boiler or process heater at the source, except as provided under 40 CFR 63.7522.
  (1) The permittee shall show compliance with Item 3 of Table 3 to 40 CFR 63, Subpart DDDDD annually as specified in 40 CFR 63.7500(f).
  (2) The Energy Assessments for EPN's 526, 527, and 535 as required by Item 4 of Table 3 to 40 CFR 63, Subpart DDDDD were conducted on June 15 – 18, 2015.
  (3) The Energy Assessment for EPN 514 as required by Item 4 of Table 3 to 40 CFR 63, Subpart DDDDD was conducted on February 24, 2020.
[4] = The permittee shall maintain records of the monthly consumption for each type of fuel component (natural gas, hydrogen, and process gas) used at each boiler, and the monthly average heat input rate of each fuel mixture in mmBtu/mmscf; and the monthly emissions for each pollutant shall be calculated based on the emission factors and fuel usage. The emission factor shall be determined from the most recent performance test approved by the Division.
[5] = The permittee shall keep records on file of the manufacturer's recommendations for:
  (1) Calibrations of the excess oxygen analyzer as per the manufacturer's recommendations;
  (2) Calibrations and filter checks on the fuel gas analyzer as per the manufacturer's recommendations;
  (3) Calibration of the fuel gas flow meter as per the manufacturer's recommendations;

**Emission Units: 010 (EPN 514) South Cracking Furnace #13,
011 (EPN 526) North Cracking Furnace 1A; (EPN 527) North Cracking Furnace 2A
012D (EPN 534A) EDC Cracking Furnace #3A,
012B (EPN 535) EDC Cracking Furnace #4, 012C (EPN 536) EDC Cracking Furnace #5**

(4) Inspect the furnace, insulation, piping and refractory, and repair / replace components as per the manufacturer's recommendations;
(5) Inspect the burners and clean / replace components as per the manufacturer's recommendations;
(6) Inspect the burner flame pattern and adjust as per the manufacturer's recommendations; and
(7) Conducting a tune-up of the boiler in accordance with 40 CFR 63.7540(a)(10)(i)-(iii) and 40 CFR 63.7540(a)(10)(vi)(B).

[6] = The following control technology, equipment and method are required to meet Best Available Control Technology (BACT) demonstration for Greenhouse Gasses (as CO_2e) emissions:
(1) Utilizing clean, gaseous fuel.
(2) Good heater design, including insulation and minimization of potential for air infiltration;
(3) Good combustion practices and proper burner design and operation;
(4) Proper furnace operation and maintenance;
(5) Preheating of combustion gases through a heat recovery system to reduce heat load and fuel consumption at the furnace; and
(6) Designing a furnace with a minimum thermal efficiency as guaranteed by the manufacturer for each fuel used.

The permittee shall keep records on file of the manufacturer's recommendations for:
(i) Calibrations of the excess oxygen analyzer as per the manufacturer's recommendations following 40 CFR 60 Appendix B4, but no less than once every quarter;
(ii) Calibrations of the fuel gas analyzer as per the manufacturer's recommendations following the procedures in 40 CFR 98.33 and quality assurance requirements of 40 CFR 98.34;
(iii) Calibration of the fuel gas flow meter as per the manufacturer's recommendations;
(iv) Inspect the furnace, insulation, piping and refractory, and repair / replace components as per the manufacturer's recommendations;
(v) Inspect the burners and clean / replace components as per the manufacturer's recommendations;
(vi) Inspect the burner flame pattern and adjust as per the manufacturer's recommendations;
(vii) Conduct periodic thermography readings of the furnace shell in areas recommended by the manufacturer and according to the schedule recommended by the manufacturer (at least annually).
(viii) Conducting a tune-up of the process heater in accordance with 40 CFR 63.7540(a)(10)(i)-(iii) and 40 CFR 63.7540(a)(10)(vi)(B).

[7] = Pursuant to 401 KAR 51:001, Section 1(208), EPN 534A meets the definition of a replacement unit; by taking the place of, is functionally equivalent to, and does not alter the basic design parameter of the existing Cracking Furnace #3.

Emission Units: 034A (EPN 519) North Cracking Decoking Pot, 034D (EPN 520A) South Cracking Decoking Pot, 034C (EPN 521) East Cracking Decoking Pot				
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis***	**Compliance Method**
For Emissions Units 034A (EPN 519) and 034C (EPN521)				
PM	When $P \leq 0.5$ tons/hr $E = 2.58$ lb/hr When $P > 0.5, \leq 30$ tons/hr $E = 4.10 \times P^{0.67}$ Where: E = PM in lb/hr; P = process rate in tons/hr	401 KAR 61:020, Section 3(2)	034A: 2,016.85 lb/hr 034C: 2,864.64 lb/hr	Operate scrubbers per standard operating procedures at all times.
	40% Opacity	401 KAR 61:020, Section 3(1)	NA	Monitor/Record daily visible emissions while in operation.
For Emissions Unit 034D (EPN 520A)				
PM	When $P \leq 0.5$ tons/hr $E = 2.34$ lb/hr When $P > 0.5, \leq 30$ tons/hr $E = 3.59 \times P^{0.62}$ Where: E = PM in lb/hr; P = process rate in tons/hr	401 KAR 59:010, Section 3(2)	034A: 2,016.85 lb/hr	Operate scrubbers per standard operating procedures at all times.
	20% Opacity	401 KAR 59:010, Section 3(1)(a)	NA	Monitor/Record daily visible emissions while in operation.

Initial Construction Date: 034A (EPN 519) – 1973; 034D (EPN 520A) – 2023;
034C (EPN 521) – 1973

034A (EPN 519) North Cracking Decoking Pot (Furnace 1A and 2A)
Decoking Duration: 192 hrs per year for both furnaces.
Max Process Rate: 83.69 lb/hr Coke + 12,600 lb/hr Steam (total = 6.34 tons per hour)
Control Device: Quench Scrubber

034D (EPN 520A) South Cracking Decoking Pot (Furnace #13 and #5)
Decoking Duration: 12 hrs @ 14 per year (168 hrs per year) for both furnaces simultaneously.
Max Process Rate: 198.39 lb/hr Coke + 18,900 lb/hr Steam (total = 9.55 tons per hour)
Control Device: Quench Scrubber

034C (EPN 521) East Cracking Decoking Pot (Furnace #3 and #4)
Decoking Duration: 216 hrs per year per furnace **
Max Process Rate: 253.58 lb/hr Coke + 12,727 lb/hr Steam (total = 6.49 tons per hour)
Control Device: Quench Scrubber

Emission Units: 034A (EPN 519) North Cracking Decoking Pot, 034D (EPN 520A) South Cracking Decoking Pot, 034C (EPN 521) East Cracking Decoking Pot

Applicable Regulation:
401 KAR 59:010, New process operations, applies to each affected facility or source, associated with a process operation, which is not subject to another emission standard with respect to particulates in 401 KAR Chapter 59, commenced on or after July 2, 1975. The South Cracking Decoking Pots (EPN 520A) was replaced in 2023, therefore 401 KAR 59:010 is applicable.

401 KAR 61:020. Existing process operations applies to each affected facility or source, associated with a process operation, which is not subject to another emission standard with respect to particulates in 401 KAR Part 61, commenced before July 2, 1975. The North and East Cracking Decoking Pots (EPN 519 and EPN 521) were constructed in 1973, therefore 401 KAR 61:020 is applicable.

Comments:
* Emission factors are based on the dimensions of the cracking furnace tubes being decoked and estimated thickness of coke on the inside of the tubes, as well as the estimated PM at the Decoke Pot Inlet as estimated in an October 15, 1973 engineering study by the then B. F. Goodrich Chemical Company. For PTE purposes, the minimum time for decoking operations per decoking event have been used in calculating emissions.
** Only one furnace is taken off-line at a time for decoking operations.

The particulate matter emissions are based on engineering estimates and have not been verified by testing. Unless these emissions are verifiable, the Division cannot consider any future change in particulate matter emissions from decoking pots as being creditable.

Emission Unit: 009 (EPN 524) Vinyl Chloride Flare (Unassisted)

Pollutant	Emission Limit or Standard	Regulatory Basis for Emission Limit or Standard	Emission Factor Used and Basis	Compliance Method
PM	No more than 20% Opacity for more than 3 minutes in any 1 day	401 KAR 63:015, Section 3	NA	Monitor/Record daily visible emissions when waste gases are sent to flare.

Initial Construction Date: 1967

Process Description:
009 (EPN 524) Vinyl Chloride Flare
The Vinyl Chloride Flare is used for emergency relief valve discharges from equipment in the EDC-VCl plant and as a control device for residual leaked material from relief valves, rupture disks and emergency shutdown equipment. The presence of the flare pilot flame will be monitored to ensure proper operation of the flare for safety purposes. In the event of a relief valve discharge subject to the requirements of 40 CFR 61.65(d), only the requirements listed under **8. Alternative Operating Scenario** under **Section B** of permit V-19-016 for EPN 524 shall apply.

Applicable Regulation:
401 KAR 57:002, Section 2, 40 C.F.R. 61.60 to 61.71, (Subpart F), National Emission Standard for Vinyl Chloride applies to plants which produce (1) ethylene dichloride by reaction of oxygen

Emission Unit: 009 (EPN 524) Vinyl Chloride Flare (Unassisted)

and hydrogen chloride with ethylene, (2) vinyl chloride by any process, and/or (3) one or more polymers containing any fraction of polymerized vinyl chloride. 40 CFR 61, Subpart F, applies to the vinyl chloride flare during a relief valve discharge pursuant to 40 CFR 61.65(d)(2)(i).

401 KAR 63:015, Flares, applies to each affected facility which means flares as defined as a device at the tip of a stack or other opening used for the disposal of waste gas streams by combustion. The Vinyl Chloride Flare is subject to 401 KAR 63:015 when the flare is used to combust waste gas streams.

Comments:
Pursuant to 401 KAR 52:020, Section 10, the flare shall be operated with a pilot flame present at all times and the presence of a flare pilot flame shall be monitored using a thermocouple or any other equivalent device to detect the presence of a flame.

Pursuant to 40 CFR 61.65(d)(2), a relief valve discharge that is ducted to a flare that is continually operating while emissions from the release are present at the flare shall comply with the requirements of 40 CFR 60.18.

Pursuant to 40 CFR 60.18(c)(1), flares shall be designed for and operated with no visible emissions as determined by the methods specified in 40 CFR 60.18(f), except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

Pursuant to 40 CFR 60.18(f)(1), method 22 of appendix A to 40 CFR 60 shall be used to determine the compliance of flares with the visible emission provisions of 40 CFR 60, Subpart A. The observation period is 2 hours and shall be used according to Method 22.

Pursuant to 40 CFR 61.65(d)(2)(i), for the purposes of 40 CFR 60.18(d), the volume and component concentration of each relief valve discharge shall be estimated and calculation shall be made to verify ongoing compliance with the design and operating requirements of 40 CFR 60.18(c)(3) through (c)(6). These calculations shall be made and reported quarterly for all discharges within the quarter.

Requirements applicable to the unassisted Vinyl Chloride Flare (EPN 524) located at Westlake Vinyls, Inc. have been incorporated into permit V-19-016 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** d.(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: 036 (EPN FUG) Fugitives

Initial Construction Date: 1991

Process Description:

036 (EPN FUG) Monomers Plant Fugitives

The following is an approximate count of the total pipeline equipment at the entire Monomers and E&E plants.

(FUG-MON-H) Monomers Plant Fugitives Subject to MACT H

Process ID's 1-6, 19-24 Includes all pipeline equipment at the Monomers plant to which 40 CFR 63, Subpart H, 40 CFR 60, Subpart VV; or 40 CFR 61, Subparts F or V, are applicable.

3,612	Gas/Vapor Valves	9,024	Light Liquid Valves
0	Heavy Liquid Valves	14,995	Gas/Vapor Connectors
34,151	Light Liquid Connectors	0	Heavy Liquid Connectors
124	Light Liquid Pumps	0	Heavy Liquid Pumps
9	Compressors	49	Relief Valves

(FUG-MON) Monomers Plant Fugitives not Subject to MACT H

Process ID's 7-14 Includes all pipeline equipment at the Monomers plant to which 40 CFR 63, Subpart H, 40 CFR 60, Subpart VV; or 40 CFR 61, Subparts F or V, are not applicable.

1,642	Gas/Vapor Valves	128	Light Liquid Valves
118	Heavy Liquid Valves	5,929	Gas/Vapor Connectors
5,929	Light Liquid Connectors	1,376	Heavy Liquid Connectors
0	Light Liquid Pumps	3	Heavy Liquid Pumps
0	Compressors	6	Relief Valves

(FUG-MON-NG) Monomers Plant Fugitives in Natural Gas Service

Process ID's 15-16 Includes all pipeline equipment at the Monomers and E&E plants in Natural Gas Service for which 40 CFR 63, Subpart H, 40 CFR 60, Subpart VV; or 40 CFR 61, Subparts F or V, are not applicable.

1,389	Gas Valves	15,199	Gas Connectors

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 a significant increase in emissions on potential to emit.

Monomers Plant Fugitives Subject to 401 KAR 51:017 from 2020 Expansion Project

The following pipeline equipment are from the 2020 Expansion Project at the Monomers Plant. The pipeline equipment count listed below are from Monomers Plant Fugitives and Monomers Plant Fugitives in Natural Gas Service; and reflects an accurate count of the equipment as of the

Emission Unit: 036 (EPN FUG) Fugitives

date of issuance of permit V-19-016 and reflects the number of each type of equipment subject to Best Available Control Technology (BACT) pursuant to 401 KAR 51:017, Section 8.

Monomers Plant Fugitives Subject to 401 KAR 51:017

Process ID 17

225	Gas/Vapor Valves	414	Light Liquid Valves
6	Heavy Liquid Valves	958	Gas/Vapor Connectors
1,580	Light Liquid Connectors	18	Heavy Liquid Connectors
6	Light Liquid Pumps	1	Heavy Liquid Pumps
0	Compressors	4	Relief Valves

Monomers Plant Fugitives in Natural Gas Service Fugitives Subject to 401 KAR 51:017

Process ID 18

278	Gas Valves	3,040	Gas Connectors

Applicable Regulation:

401 KAR 51:017, Prevention of Significant Deterioration of Air Quality applies to the construction of a new major stationary source or a project at an existing major stationary source that commences construction after September 22, 1982, and locates in an area designated attainment or unclassifiable under 42 U.S.C. 7407(d)(1)(A)(ii) and (iii). Westlake Vinyls, Inc. – Vinyls Plant is a major source pursuant to Prevention of Significant Deterioration of Air Quality (PSD) and is subject to the requirements of PSD for pipeline equipment added pursuant to the 2020 Expansion project at the Monomers Plant as part of emission unit 036 (EPN FUG).

401 KAR 57:002, Section 2, 40 C.F.R. 61.60 to 61.71, (Subpart F), National Emission Standard for Vinyl Chloride applies to plants which produce (1) ethylene dichloride by reaction of oxygen and hydrogen chloride with ethylene, (2) vinyl chloride by any process, and/or (3) one or more polymers containing any fraction of polymerized vinyl chloride. 40 CFR 61, Subpart F, applies to the Monomers Plant Fugitives (EPN FUG-MON-H). However, pursuant to 40 CFR 63.160(b)(1) and (2), after the compliance date for a process unit, equipment to which 40 CFR 63, Subpart H applies that are also subject to the provisions of 40 CFR 60 and 40 CFR 61 will be required to comply only with the provisions of 40 CFR 63, Subpart H.

401 KAR 57:002, Section 2, 40 C.F.R. 61.240 to 61.247, Tables 1 to 2 (Subpart V), National Emission Standard for Equipment Leaks (Fugitive Emission Sources). Pursuant to 40 CFR 61.240(b), the provisions of 40 CFR 61, Subpart V apply to the sources listed in 40 CFR 61.240(a) after the date of promulgation of a specific subpart in 40 CFR 61. Pursuant to 40 CFR 61, Subpart F, the provisions of 40 CFR 61, Subpart V demonstrates compliance for the fugitive emissions subject to 40 CFR 61, Subpart F. Therefore, 40 CFR 61, Subpart V is applicable.
However, pursuant to 40 CFR 63.160(b)(1) and (2), after the compliance date for a process unit, equipment to which 40 CFR 63, Subpart H applies that are also subject to the provisions of 40 CFR 60 and 40 CFR 61 will be required to comply only with the provisions of 40 CFR 63, Subpart H.

401 KAR 60:005 Section 2(2)(bbb), 40 C.F.R. 60.480 to 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 only to the following pipeline equipment in the Monomer Plant:

Emission Unit: 036 (EPN FUG) Fugitives

East EDC Oxy Reactor Off-Gas Recycling	#8 EDC Shore Tank
South EDC Oxy A Reactor Off-Gas Recycling	#9 EDC Shore Tank
South EDC Oxy B Reactor Off-Gas Recycling	#3 EDC Cracking Furnace
Oxy Crude EDC Stripper	

401 KAR 63:002 Section 2(4)(c), 40 C.F.R. 63.160 to 63.183, Tables 1 to 4 (Subpart H), National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks applies to pumps, compressors, agitators, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, connectors, surge control vessels, bottoms receivers, instrumentation systems, and control devices or closed vent systems required by 40 CFR 63, Subpart H that are intended to operate in organic hazardous air pollutant service 300 hours or more during the calendar year within a source subject to the provisions of a specific subpart in 40 CFR 63 that references 40 CFR 63, Subpart H. Pursuant to 40 CFR 63.160(b)(1) and (2), after the compliance date for a process unit, equipment to which 40 CFR 63, Subpart H applies that are also subject to the provisions of 40 CFR 60 and 40 CFR 61 will be required to comply only with the provisions of 40 CFR 63, Subpart H. Therefore, the pipeline equipment in the Monomer Plant (EPN FUG-MON-H) is subject to the requirements of 40 CFR 63, Subpart H.

401 KAR 63:020, Potentially hazardous matter or toxic substances [State-Origin Requirement], applies to each affected facility which emits or may emit potentially hazardous matter or toxic substances, provided that such emissions are not elsewhere subject to the provisions of the administrative regulations of the Division. This applies to the chlorine and hydrochloric acid (HCl) emissions from EPN FUG-MON-H not subject to 40 CFR 63, Subpart H.

Comments:

Pursuant to 401 KAR 51:017, Section 8, the following control technology, equipment and method are required to meet Best Available Control Technology (BACT) demonstration for Volatile Organic Compounds (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 H.

(2) For units subject to 40 CFR 63, Subpart H, the permittee shall comply with the requirements from 40 CFR 63, Subpart H (LDAR) and in accordance with **Compliance Demonstration Method** (1) to **1. Operating Limitations** for emission unit 036 (EPN FUG) in permit V-19-016 for a leak as defined as a reading of 500 ppmv.

(3) For units not subject to 40 CFR 63, Subpart H, but subject to 401 KAR 51:017, the permittee shall comply with the requirements of 40 CFR 63, Subpart H and in accordance with **Compliance Demonstration Method** (1) to **1. Operating Limitations** for emission unit 036 (EPN FUG) in permit V-19-016 for a leak as defined as a reading of 500 ppmv.

(4) For pumps subject to 401 KAR 51:017, the permittee shall install leakless pumps with dual mechanical seals or with a barrier fluid to reduce leaks. If a leakless pump is not feasible, the permittee shall submit justification as to its technical infeasibility.

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

Emission Unit: 036 (EPN FUG) Fugitives

(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 H.
(2) For units subject to 40 CFR 63, Subpart H (if any), the permittee shall implement the requirements from 40 CFR 63, Subpart H (LDAR) and in accordance with **Compliance Demonstration Method** (2) to **1. Operating Limitations** for emission unit 036 (EPN FUG) in permit V-19-016 for a leak as defined as a reading of 500 ppmv.
(3) For units not subject to 40 CFR 63, Subpart H, but subject to 401 KAR 51:017, the permittee shall comply with the requirements of 40 CFR 63, Subpart H and in accordance with **Compliance Demonstration Method** (1) to **1. Operating Limitations** for emission unit 036 (EPN FUG) in permit V-19-016 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 63, Subpart H or 401 KAR 51:017; and are therefore uncontrolled.

Pursuant to 401 KAR 52:020, Section 10, the permittee shall incorporate the requirements specified in 40 CFR 63, Subpart H in the required leak detection and repair (LDAR) program. If any of the equipment qualifies for the specific exemptions available in 40 CFR 63, Subpart H, the permittee shall maintain records of the reason(s) why the equipment is exempt. A copy of the LDAR program shall be kept available at a readily accessible location for inspection.

Emission Units: 035 (EPN 457) South Synthesis Cooling Tower, 037 (EPN 458) East Cracking Cooling Tower, 038 (EPN 459) South Cracking Cooling Towers

Pollutant	Emission Limit or Standard	Regulatory Basis for Emission Limit or Standard	Emission Factor Used and Basis	Compliance Method
PM	035: 2.34 lb/hr 038: 2.34 lb/hr	401 KAR 59:010 Section 3(2)	0.1668 lb/mmgal[1] Reisman and Frisbie	Compliance is assumed based on the information provided in the application[2]
	037: 2.58 lb/hr	401 KAR 61:020 Section 3(2)(a)		
	035/038: 20% Opacity	401 KAR 59:010 Section 3(1)(a)	NA	
	037: 40% Opacity	401 KAR 61:020 Section 3(1)(a)		

**Emission Units: 035 (EPN 457) South Synthesis Cooling Tower,
037 (EPN 458) East Cracking Cooling Tower,
038 (EPN 459) South Cracking Cooling Towers**

Initial Construction Date and/or Modification Date: 035 – 1981 (Reconstructed 2017); 037 – 1967; 038 – 1965 (Reconstructed 2018)

Process Description:
035 (EPN 457) South Synthesis Cooling Tower CT-1A
Recirculation Rate: 30,000 gallons/min
Equipped with mist eliminator with 0.001% Drift Loss
Non-contact Cooling Tower

037 (EPN 458) East Cracking Cooling Tower CT-1B
Recirculation Rate: 18,000 gallons/min
Equipped with mist eliminator with 0.001% Drift Loss
Non-contact Cooling Tower

038 (EPN 459) South Cracking Cooling Tower CT-2
Recirculation Rate: 18,000 gallons/min
Equipped with mist eliminator with 0.001% Drift Loss
Non-contact Cooling Tower

Applicable Regulation:
401 KAR 59:010, New process operations applies to each affected facility or source, associated with a process operation, which is not subject to another emission standard with respect to particulates in 401 KAR Chapter 59, commenced on or after July 2, 1975. The South Synthesis and South Cracking Cooling Towers (EPN 457 and EPN 459) were reconstructed after July 2, 1975 and are subject to the requirements of 401 KAR 59:010.

401 KAR 61:020. Existing process operations applies to each affected facility or source, associated with a process operation, which is not subject to another emission standard with respect to particulates in 401 KAR 61, commenced before July 2, 1975. The East Cracking Cooling Tower (EPN 458) was constructed before July 2, 1975 and is subject to the requirements of 401 KAR 61:020.

401 KAR 63:002 Section 2(4)(a), 40 C.F.R. 63.100 to 63.107, Tables 1 to 4 (Subpart F), National Emission Standards for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry, applies to chemical manufacturing process units that manufacture as a primary product one or more of the chemicals listed in table 1 of 40 CFR 63, Subpart F; or tetrahydrobenzaldehyde (CAS Number 100-50-5); or crotonaldehyde (CAS Number 123-73-9), use as a reactant or manufacture as a product, or co-product, one or more of the organic hazardous air pollutants listed in table 2 of 40 CFR 63, Subpart F, and are located at a plant site that is a major source as defined in section 112(a) of the Act. The South Synthesis, East Cracking, and South Cracking Cooling Towers are subject to the requirements of 40 CFR 63, Subpart F.

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

**Emission Units: 035 (EPN 457) South Synthesis Cooling Tower,
037 (EPN 458) East Cracking Cooling Tower,
038 (EPN 459) South Cracking Cooling Towers**

Comments:
Based on the recirculation rates, density of water, TSP's and manufacturer guarantees of the mist eliminators of each cooling tower, the maximum tons per hour throughput of the solid particles flowing through the cooling towers are less than 0.50 tons per year. Therefore, for applicability of 401 KAR 59:010 and 401 KAR 61:020, the equations for throughputs over 0.50 tons per year are not necessary.

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.

[1] = $PM/PM_{10}/PM_{2.5}$ EF from "Calculating Realistic PM_{10} Emissions from Cooling Towers," Abstract No. 216, Session No. AM-1b, Joel Reisman and Gordon Frisbie, Greystone Environmental Consultants, Inc., 4/11/2002
[2] = Mist Eliminator Manufacturer's Guarantee of 0.001% for 035, 037, and 038 each.

Emission Unit: 080 (EPN 080) #1 Fire Water Pump

Initial Construction Date: 080 – 1975

Process Description:
080 (EPN 080) #1 Fire Water Pump
Detroit GM Engine
Power Rating: 170 hp
Primary Fuel: Fuel Oil #2 (Diesel)

Applicable Regulation:
401 KAR 63:002 Section 2(4)(eeee), 40 C.F.R. 63.6580 to 63.6675, Tables 1a to 8, and Appendix A (Subpart ZZZZ), National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines applies to stationary RICE located at major and area sources of HAP emissions. Pursuant to 40 CFR 63.6590(a)(1)(i), the engine is an affected sources under 40 CFR 63, Subpart ZZZZ and is classified as an existing stationary RICE located at a major source of HAP emissions.

Comments:
Pursuant to 40 CFR 63.6602 and Item 1 in Table 2c to 40 CFR 63, Subpart ZZZZ, the permittee of an existing stationary RICE with a site rating of equal to or less than 500 brake hp located at a major source of HAP emissions, must comply with the emission limitations and other requirements in Table 2c to 40 CFR 63, Subpart ZZZZ as follows:
(1) Change oil and filter every 500 hours of operation or annually, whichever comes first;
(2) Inspect air cleaner every 1,000 hours of operation or annually, whichever comes first; and
(3) Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.

Emission Units: 081A (EPN 081B) #2A Fire Water Pump, 082A (EPN 082A) #3A Fire Water Pump, 083 (EPN 083) #4 Fire Water Pump					
Pollutant	**Emission Limit or Standard**	**Regulatory Basis for Emission Limit or Standard**	**Emission Factor Used and Basis lb/1000gal**		**Compliance Method**
CO	2.6 g/hp-hr	40 CFR 60.4205(c), Table 4	EPN 081B	60.34	Purchase an engine certified to 40 CFR 60.4205(c), The engine must be installed and configured according to the manufacturer's emission-related specifications, except as permitted in 40 CFR 60.4211(g)(2).
			EPN 082A	61.17	
			EPN 083	19.31	
NO_X	3.0 g/hp-hr		EPN 081B	93.68	
			EPN 082A	94.96	
			EPN 083	115.88	
PM	0.15 g/hp-hr		EPN 081B	5.03	
			EPN 082A	5.09	
			EPN 083	2.25	

Initial Construction Date: 081B – 2021; 082A – 2014; 083 – 2011

Process Description:

081B (EPN 081B) #2B Fire Water Pump
Cummins CFP9E-F20 EPA Tier 3
Power Rating: 282 hp
Primary Fuel: Fuel Oil #2 (Diesel)
Fuel Rate: 0.0146 $_{1000}$ gallons/hr
Manufacture Date: May 2021

082A (EPN 082A) #3A Fire Water Pump
Cummins Engine
Power Rating: 327 hp
Primary Fuel: Fuel Oil #2 (Diesel)
Fuel Rate: 0.017 $_{1000}$ gallons/hr
Manufacture Date: February 2014

083 (EPN 083) #4 Fire Water Pump
John Deere Engine
Power Rating: 305 hp
Primary Fuel: Fuel Oil #2 (Diesel)
Fuel Rate: 0.016 $_{1000}$ gallons/hr
Manufacture Date: April 2011

Applicable Regulation:
401 KAR 60:005 Section 2(2)(dddd), 40 C.F.R. 60.4200 to 60.4219, Tables 1 to 8 (Subpart IIII), Standards of Performance for Stationary Compression Ignition Internal Combustion Engines applies to manufacturers and permittees of stationary CI ICE and other persons as specified in 40 CFR 60.4200(a)(1) through (4). 081B, 082A, and 083 are stationary CI ICE and were constructed after the required manufacture dates of 40 CFR 60, Subpart IIII so they are subject to the requirements of 40 CFR 60, Subpart IIII.

401 KAR 63.002 Section 2(4)(eeee), 40 C.F.R. 63.6580 to 63.6675, Tables 1a to 8, and Appendix A (Subpart ZZZZ), National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines applies to stationary RICE located at major and area sources of HAP emissions. Pursuant to 40 CFR 63.6590(c)(6), an affected source must meet the requirements of 40 CFR 63, Subpart ZZZZ by meeting the requirements of 40 CFR 60, Subpart IIII. No further requirements apply for such engines under 40 CFR 63, Subpart ZZZZ.

**Emission Units: 081A (EPN 081B) #2A Fire Water Pump,
082A (EPN 082A) #3A Fire Water Pump,
083 (EPN 083) #4 Fire Water Pump**

Comments:
Pursuant to 40 CFR 60.4211(g)(2), if the permittee does not install, configure, operate, and maintain their engine greater than or equal to 100 hp and less than or equal to 500 hp and control device according to the manufacturer's emission-related written instructions, or the permittee changes emission-related settings in a way that is not permitted by the manufacturer, the permittee must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, the permittee must conduct an initial performance test to demonstrate compliance with the applicable emission standards within 1 year of startup, or within 1 year after an engine and control device is no longer installed, configured, operated, and maintained in accordance with the manufacturer's emission-related written instructions, or within 1 year after the permittee changes emission-related settings in a way that is not permitted by the manufacturer.

Emission Factors for EPN 081B, EPN 082A, and EPN 083 for criteria pollutants are based on vendor data, except that SO_2 emissions are based on AP-42 Ch. 3.3. HAP emissions are based on AP-42 Ch. 3.3 and GHG emissions are based on 40 CFR 98, Subpart C.

**Emission Units: 084 (EPN 084) Emergency Generator for Fire Water Pump,
085 (EPN 085) Emergency Generator for Sodium Hypochlorite Tower,
090 (EPN 090) Chlorine Plant Emergency Generator,
091 (EPN 091) E&E Plant Emergency Generator,
092 (EPN 092) Chlorine Plant Emergency Generator**

EU	Pollutant	Emission Limit or Standard	Regulatory Basis for Emission Limit or Standard	Emission Factor Used and Basis (lb/1000gal)	Compliance Method
084, 085	CO	3.5 g/kW-hr	40 CFR 60.4205(b), 40 CFR 60.4202(a)(2), 40 CFR part 1039, appendix I, Tier 3	86.89 (EPA Cert)	Purchase an engine certified to 40 CFR 60.4205(b), and install and configure to manufacturer's specifications, except as permitted in 40 CFR 60.4211(g)(3).
	NOx	4.0 g/kW-hr		112.64 (EPA Cert)	
	PM	0.20 g/kW-hr		5.15 (EPA Cert)	
090	CO	3.5 g/kW-hr	40 CFR 60.4205(b), 40 CFR 60.4202(a)(2), 40 CFR part 1039, appendix I, Tier 2	24.84 (Mfc)	
	NOx	6.4 g/kW-hr		190.47 (Mfc)	
	PM	0.20 g/kW-hr		1.24 (Mfc)	
091	CO	3.5 g/kW-hr		7.58 (Mfc)	
	NOx	6.4 g/kW-hr		198.61 (Mfc)	
	PM	0.20 g/kW-hr		1.24 (Mfc)	
092	CO	3.5 g/kW-hr		20.77 (Mfc)	
	NOx	6.4 g/kW-hr		240.94 (Mfc)	
	PM	0.20 g/kW-hr		1.25 (Mfc)	

Initial Construction Date: 084 – 2016; 085 – 2017; 090 – 2023; 091 – 2024 (Proposed); 092 – 2024 (Proposed)

**Emission Units: 084 (EPN 084) Emergency Generator for Fire Water Pump,
085 (EPN 085) Emergency Generator for Sodium Hypochlorite Tower,
090 (EPN 090) Chlorine Plant Emergency Generator,
091 (EPN 091) E&E Plant Emergency Generator,
092 (EPN 092) Chlorine Plant Emergency Generator**

Process Description:

084 (EPN 084) Emergency Generator for Fire Water Pump

Caterpillar Engine (EPA Certified)
Power Rating: 546 hp
Primary Fuel: Fuel Oil #2 (Diesel)
Fuel Rate: 0.028 $_{1000}$ gallons/hr
Manufacture Date: August 2016

085 (EPN 085) Emergency Generator for Sodium Hypochlorite Tower

Caterpillar Engine (EPA Certified)
Power Rating: 546 hp
Primary Fuel: Fuel Oil #2 (Diesel)
Fuel Rate: 0.028 $_{1000}$ gallons/hr
Manufacture Date: August 2017

090 (EPN 090) Chlorine Plant Emergency Generator

Caterpillar D500 GC Engine (EPA Certified)
Power Rating: 670.5 hp (500 kW)
Primary Fuel: Fuel Oil #2 (Diesel)
Fuel Rate: 0.0357 $_{1000}$ gallons/hr
Manufacture Date: 2022

091 (EPN 091) E&E Plant Emergency Generator

Caterpillar C18 Engine (EPA Certified)
Power Rating: 1,005.8 hp (750 kW)
Primary Fuel: Fuel Oil #2 (Diesel)
Fuel Rate: 0.0497 $_{1000}$ gallons/hr
Manufacture Date: 2023 (Proposed)

092 (EPN 092) Chlorine Plant Emergency Generator

Caterpillar C18 PGAM Engine (EPA Certified)
Power Rating: 804.6 hp (600 kW)
Primary Fuel: Fuel Oil #2 (Diesel)
Fuel Rate: 0.0427 $_{1000}$ gallons/hr
Manufacture Date: 2024 (Proposed)

Applicable Regulation:

401 KAR 60:005 Section 2(2)(dddd), 40 C.F.R. 60.4200 to 60.4219, Tables 1 to 8 (Subpart IIII), Standards of Performance for Stationary Compression Ignition Internal Combustion Engines applies to manufacturers and permittees of stationary CI ICE and other persons as specified in 40 CFR 60.4200(a)(1) through (4). Emission units 084, 085, 090, and 091 are stationary CI ICE and were constructed after the required manufacture dates of 40 CFR 60, Subpart IIII so they are subject to the requirements of 40 CFR 60, Subpart IIII.

**Emission Units: 084 (EPN 084) Emergency Generator for Fire Water Pump,
085 (EPN 085) Emergency Generator for Sodium Hypochlorite Tower,
090 (EPN 090) Chlorine Plant Emergency Generator,
091 (EPN 091) E&E Plant Emergency Generator,
092 (EPN 092) Chlorine Plant Emergency Generator**

401 KAR 63.002 Section 2(4)(eeee), 40 C.F.R. 63.6580 to 63.6675, Tables 1a to 8, and Appendix A (Subpart ZZZZ), National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines applies to stationary RICE located at major and area sources of HAP emissions. Pursuant to 40 CFR 63.6590(c)(6), an affected source must meet the requirements of 40 CFR 63, Subpart ZZZZ by meeting the requirements of 40 CFR 60, Subpart IIII. No further requirements apply for such engines under 40 CFR 63, Subpart ZZZZ.

Comments:
Pursuant to 40 CFR 60.4211(g)(3), if the permittee does not install, configure, operate, and maintain their engine greater than 500 hp and control device according to the manufacturer's emission-related written instructions, or the permittee changes emission-related settings in a way that is not permitted by the manufacturer, the permittee must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, the permittee must conduct an initial performance test to demonstrate compliance with the applicable emission standards within 1 year of startup, or within 1 year after an engine and control device is no longer installed, configured, operated, and maintained in accordance with the manufacturer's emission-related written instructions, or within 1 year after the permittee changes emission-related settings in a way that is not permitted by the manufacturer. The permittee must conduct subsequent performance testing every 8,760 hours of engine operation or 3 years, whichever comes first, thereafter to demonstrate compliance with the applicable emission standards.

The emission factors for CO, NO_X, VOC, and PM for emission units 084 and 085 are based on EPA certified emission factors for engine certification numbers GCPXL12.5NYS-008 and HCPXL12.5NYS-008, respectively. The emission factors for CO, NO_X, VOC, and PM for emission units 084 and 085 are based on the manufacturer, for which the emission factors are also EPA certified. Greenhouse gas emissions are based on 40 CFR 98 and HAP emissions are based on AP-42, Chapters 3.3 and 3.4 for emission units 084 and 085; and 090 and 091, respectively.

Emission Unit: 088 (EPN 088) Portable Air Compressor

Initial Construction and/or Modification Date: 088 – 2018

Process Description:
088 (EPN 088) Portable Air Compressor
Caterpillar Engine
Power Rating: 540 hp
Primary Fuel: Fuel Oil #2 (Diesel)

Applicable Regulation:
None

Emission Unit: 088 (EPN 088) Portable Air Compressor

Non-Applicable Regulations:
401 KAR 60:005 Section 2(2)(dddd), 40 C.F.R. 60.4200 to 60.4219, Tables 1 to 8 (Subpart IIII), Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, applies to manufacturers and permittees of stationary CI ICE and other persons as specified in 40 CFR 60.4200(a)(1) through (4). See Comments.

401 KAR 63:002 Section 2(4)(eeee), 40 C.F.R. 63.6580 to 63.6675, Tables 1a to 8, and Appendix A (Subpart ZZZZ), National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines applies to stationary RICE located at major and area sources of HAP emissions. See Comments.

Comments:
Pursuant to 401 KAR 52:020, Section 10, to preclude each portable internal combustion engine from being classified as "not a nonroad engine" as defined in 40 CFR 1068.30, the engine shall not remain at any location for more than 12 consecutive months. For any engine that replaces an engine at a location and that is intended to perform the same or similar function as the engine replaced, the time period of both engines shall be used in calculating the consecutive time period. Records shall be maintained specifying each location of the engines; including the initial date at that location, and the date moved from that location.

Emission Unit: 012A (EPN 534) EDC Cracking Furnace #3

Pollutant	EU	Emission Limit or Standard	Regulatory Basis for Emission Limit or Standard	Emission Factor Used and Basis	Compliance Method
SO_2	012A	0.8 lb/mmBtu	401 KAR 59:015, Section 5(1)(b)	0.6 lb/mmscf (AP-42 1.4)	Burning gaseous fuel as defined in 40 CFR 63.7575.
PM		0.10 lb/mmBtu	401 KAR 59:015, Section 4(1)(b)	7.6 lb/mmscf (AP-42, Ch 1.4)	
		20% Opacity	401 KAR 59:015, Section 4(2)	N/A	

Initial Construction Date: 012A – 1993

Process Description:
012A (EPN 534) EDC Cracking Furnace #3
Capacity: 106.68 mmBtu/hr
Fuel: Process fuel gas[1]

Applicable Regulation:
401 KAR 59:015, New indirect heat exchangers, applies to the particulate matter and sulfur dioxide emissions for each indirect heat exchanger commenced on or after April 9, 1972 with a heat input capacity at or below 250 mmBtu/hour, and more than one (1) mmBtu/hour. EDC Cracking Furnace #3 is subject to 401 KAR 59:015.

401 KAR 60:005 Section 2(2)(ppp), 40 C.F.R. 60.660 to 60.668 (Subpart NNN), Standards of Performance for Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations, applies to (1) each distillation unit not discharging its vent stream into a recovery system, each combination of a distillation unit

Emission Unit: 012A (EPN 534) EDC Cracking Furnace #3

and the recovery system into which its vent stream is discharged, and (3) each combination of two or more distillation units and the common recovery system into which their vent streams are discharged that is part of a process unit that produces any of the chemicals listed in 40 CFR 60.667 as a product, co-product, by-product, or intermediate, except as provided in 40 CFR 60.660(c). Certain distillation columns vent streams in the ethylene plant could potentially be routed to the boilers. Therefore 40 CFR 60, Subpart NNN is applicable.[2]

401 KAR 60:005 Section 2(2)(ttt), 40 C.F.R. 60.700 to 60.708 (Subpart RRR), Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes, applies to (1) each reactor process not discharging its vent stream into a recovery system, (2) each combination of a reactor process and the recovery system into which its vent stream is discharged, and (3) each combination of two or more reactor processes and the common recovery system into which their vent streams are discharged or which construction, modification, or reconstruction commenced after June 29, 1990 and that is part of a process unit that produces any of the chemicals listed in 40 CFR 60.707 as a product, co-product, by-product, or intermediate, except as provided in 40 CFR 60.700(c). The ethylene plant cracking furnaces vent streams could potentially be routed to the boilers. Therefore 40 CFR 60, Subpart RRR is applicable.[3]

401 KAR 63:002 Section 2(4)(iiii), 40 C.F.R. 63.7480 to 63.7575, Tables 1 to 13 (Subpart DDDDD), National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters, applies to industrial, commercial, or institutional boilers or process heaters as defined in 40 CFR 63.7575 that are located at, or are part of, a major source of hazardous air pollutants (HAP), except as specified in 40 CFR 63.7491. EDC Cracking Furnace #3 is subject to 40 CFR 63, Subpart DDDDD.

Comments:

The Maximum Hourly Firing Rate and Annual Average Firing Rate of EPN 534 shall not exceed 106.68 lb/mmBtu on a 24-hour average basis and 12-month rolling basis.

[1] = Process fuel gas is natural gas in combination with any of the following: ethylene plant fuel gas, hydrogen, propane, ethane, recovered flare gas, and mixtures thereof.

[2] = Pursuant to 40 CFR 65.63(a)(2) as referenced by 40 CFR 60.660(d)(1) and 40 CFR 60.700(d)(1), the permittee must reduce emissions of regulated material or TOC by at least 98 weight-percent or to a concentration of less than 20 parts per million by volume, whichever is less stringent. For combustion devices, the emission reduction or concentration shall be calculated on a dry basis, and corrected to 3 percent oxygen. The permittee shall meet the requirements in 40 CFR 65.142(b) and 40 CFR 65.63(a)(2)(i) and/or 40 CFR 65.63(a)(2)(ii).

[3] = The permittee shall maintain records of the monthly consumption for each type of fuel component (natural gas, hydrogen, and process gas) used at each boiler, and the monthly average heat input rate of each fuel mixture in mmBtu/mmscf.

[4] = Pursuant to 401 KAR 52:020, Section 10, emission unit 012A EDC Cracking Furnace #3 (EPN 534) shall not be operated upon startup of emission unit 012D EDC Cracking Furnace #3A (EPN 534A).See **Section H-ALTERNATE OPERATING SCENARIOS** of permit V-19-016.

[5] = The Energy Assessment for EPN 534 as required by Item 4 of Table 3 to 40 CFR 63, Subpart DDDDD was conducted on February 24, 2020.

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 Compliance Testing
031 EPN 449	Absorber CO_2 Stripper Off	Organic HAPs	Initial	Initial	Methods 2, 4, 18	NA	17.58 lb/hr	4.1 Million pounds/day vinyl chloride monomer	CMN20050002	5/11/2005 – 5/12/2005
		Removal Efficiency					98.35%			
	Absorber CO_2 Stripper On	Organic HAPs					23.69 lb/hr			
		Removal Efficiency					98.11%			
032 EPN 453 Stack	Packed Wet Scrubber	HAPs	40 CFR 63.113(a)(2)	One Year after the issuance of V-05-011	Method 18	98% or 20 ppm @ 3% O_2	0.0062 ppm @ 3% O_2	3.6 Million pounds/day vinyl chloride monomer	CMN20100002	9/16/2010
		HCl, HF, HBr, Cl_2, Br_2	40 CFR 63.113(c)(1)(ii)		Method 26A	95% (0.45) % Removal (kg/hr)	99.5%			
032 EPN 453 Inlet	None	HCl, HF, HBr, Cl_2, Br_2			Method 26					
033 EPN 530 Stack	Quench, Absorber, Packed Wet Scrubber	HAPs	40 CFR 63.113(a)(2)	One Year after the issuance of V-05-011	Method 18	98% or 20 ppm @ 3% O_2	0.0066 ppm @ 3% O_2	3.6 Million pounds/day vinyl chloride monomer	CMN20100002	9/15/2010
		HCl, HF, HBr, Cl_2, Br_2	40 CFR 63.113(c)(1)(ii)		Method 26A	95% (0.45) % Removal (kg/hr)	99.5.72%			
033 EPN 530 Inlet	None	HCl, HF, HBr, Cl_2, Br_2			Method 26					

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 Compliance Testing
033 EPN 530 Stack	Quench, Absorber, Packed Wet Scrubber	HAPs	40 CFR 63.113(a)(2)	Once to determine compliance with new scrubber and higher production rates.	Method 18	98% or 20 ppm @ 3% O_2	0.03 ppm @ 3% O_2	4.6 Million pounds/day vinyl chloride monomer	CMN20150004	12/2/2015
		HCl, HF, HBr, Cl_2, Br_2	40 CFR 63.113(c)(1)(i)		Method 26A	99% (0.45) % Removal (kg/hr)	99.72%			
033 EPN 530 Inlet	None	HCl, HF, HBr, Cl_2, Br_2			Method 26					
032 EPN 453 Stack	Packed Wet Scrubber	HAPs	40 CFR 63.113(a)(2)	Once to determine compliance with higher production rates.	Method 18	98% or 20 ppm @ 3% O_2	0.06 ppm @ 3% O_2	4.6 Million pounds/day vinyl chloride monomer	CMN20150004	12/1/2015
		HCl, HF, HBr, Cl_2, Br_2	40 CFR 63.113(c)(1)(ii)		Method 26A	95% (0.45) % Removal (kg/hr)	99.75%			
032 EPN 453 Inlet	None	HCl, HF, HBr, Cl_2, Br_2	40 CFR 63.113(c)(1)(ii)	Once to determine compliance with higher production rates.	Method 26	95% (0.45) % Removal (kg/hr)	99.75%	4.6 Million pounds/day vinyl chloride monomer	CMN20150004	12/1/2015
005 EPN 009	None	NOx High Heat Release Rate	40 CFR 60.44b(a)(1)	Initial Test	Method 7E	0.2 lb/mmBtu	0.04 lb/mmBtu	181.19 mmBtu/hr	CMN20170001	5/9/2017 – 5/24/2017
		NOx Low Heat Release Rate				0.10 lb/mmBtu	0.034 lb/mmBtu	56.37 mmBtu/hr		5/27/2017 – 6/10/2017

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 Compliance Testing
032 EPN 453	Packed Wet Scrubber	HAPs	40 CFR 63.113(a)(2)	Once to determine compliance with higher production rates.	Method 18	98% or 20 ppm @ 3% O_2	0.057 ppm @ 3% O_2	5.43 Million pounds/day vinyl chloride monomer	CMN20170002 Performance Test Not Approved. See Footnote 2.	12/14/2018
		HCl, HF, HBr, Cl_2, Br_2	40 CFR 63.113(c)(1)(ii)		Method 26A/26	99% (0.45)	99.9%			
031 EPN 449	Absorber CO_2 Stripper Off	Absorber Removal Efficiency	40 CFR 63.113(d)	NA	Method 18	NA	99.42%	5.43 million pounds per day of vinyl chloride monomer	CMN20170003 Performance Test Not Approved. See Footnote 1.	12/15/2018
		HAPs					227.83 ppm			
031 EPN 449	Absorber CO_2 Stripper On	Absorber Removal Efficiency	40 CFR 63.113(d)	NA	Method 18	NA	99.42%	5.43 million pounds per day of vinyl chloride monomer	CMN20170003 Performance Test Not Approved. See Footnote 1.	12/15/2018
		HAPs					221.68 ppm			
033 EPN 530	Quench, Absorber, Packed Wet Scrubber	HAPs	40 CFR 63.113(a)(2)	Once to determine compliance with higher production rates.	Method 18	98% or 20 ppm @ 3% O_2	0.115 ppm @ 3% O_2	5.43 Million pounds/day vinyl chloride monomer	CMN20170002 Performance Test Not Approved. See Footnote 2.	12/16/2018
		HCl, HF, HBr, Cl_2, Br_2	40 CFR 63.113(c)(1)(i)		Method 26A/26	99% (0.45)	99.9%			

Footnotes:

(1) The recovery values for certain HAPs were outside of the range outlined in Method 18. Reanalysis of unspiked samples after hold times elapsed also showed analyte losses consistent with the spiked results.

(2) The HAP's recoveries were outside of the Method 18 allowable range. The Oxy bags also could not have the final spike conducted due to a white precipitate present in the bag.

(3) A performance test was conducted on April 21 – 22, 2015 for the Oxy and Primary Incinerators (032 (EPN 453) and 033 (EPN 530)). However, the Compliance Demonstration was not approved due to the test not being conducted under normal conditions, creating higher emission rates.

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 Compliance Testing
033 EPN 530 Stack	Quench, Absorber, Packed Wet Scrubber	HAPs	40 CFR 63.113(a)(2)	Once to determine compliance with higher production rates.	Method 18	98% or 20 ppm @ 3% O_2	19.33 ppm @ 3% O_2	5.47Million pounds/day vinyl chloride monomer	CMN20180001	1/15/2019
		HCl, HF, HBr, Cl_2, Br_2	40 CFR 63.113(c)(1)(i)		Method 26A	99% (0.45) % Removal (kg/hr)	99.4%			
033 EPN 530 Inlet	None	HCl, HF, HBr, Cl_2, Br_2	40 CFR 63.113(c)(1)(i)	Once to determine compliance with higher production rates.	Method 26	99% (0.45) % Removal (kg/hr)	99.4%	5.47 Million pounds/day vinyl chloride monomer	CMN20180001	1/15/2019
032 EPN 453 Stack	Packed Wet Scrubber	HAPs	40 CFR 63.113(a)(2)		Method 18	98% or 20 ppm @ 3% O_2	14.49 ppm @ 3% O_2			1/18/2019
		HCl, HF, HBr, Cl_2, Br_2	40 CFR 63.113(c)(1)(ii)		Method 26A	95% (0.45) % Removal (kg/hr)	99.8%			
032 EPN 453 Inlet	None	HCl, HF, HBr, Cl_2, Br_2			Method 26					
031 EPN 449	Absorber CO_2 Stripper Off	VCM	40 CFR 63.113(d)	As requested by WL for HON Group Status	18, 0010, ASTM 1945 D90	≥ 5.0 mmlb/day	5.47 mmlb/day	5.47 mmlb/day	CMN20190002	1/17/2019 – 1/18/2019
		Organic HAPs				≥ 50 ppm	275.26 ppm			
		TRE Index				1.0 ≤ 4.0	1.57			
031 EPN 449	Absorber CO_2 Stripper On	VCM	40 CFR 63.113(d)	As requested by WL for HON Group Status	18, 0010, ASTM 1945 D90	≥ 5.0 mmlb/day	5.47 mmlb/day	5.47 mmlb/day	CMN20190002	1/17/2019 – 1/18/2019
		Organic HAPs				≥ 50 ppm	306.36 ppm			
		TRE Index				1.0 ≤ 4.0	1.4			

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 Compliance Testing
003 EPN 011	None	CO lb/mmBtu Burned	To determine site specific emission factor	One Time	Method 10	NA	0.000424 lb/mmBtu	Heat Input: 104.3 mmBtu/hr H_2 Gas: 1,138.8 lb/hr, Fuel Gas: 928.5 lb/hr	CMN20190004	6/13/2019
		NOx lb/mmBtu Burned			Method 7E	NA	0.5116 lb/mmBtu			
032 EPN 453	Packed Wet Scrubber	CO lb/mmBtu Burned	To determine site specific emission factor	One Time	Method 10	N/A	0.0005 lb/mmBtu	Fuel/Process Vents heat input: 71.89 mmBtu/hr	CMN20190003	5/21/2019
		NOx lb/mmBtu Burned			Method 7E	N/A	0.00794 lb/mmBtu			
016 EPN 877	Scrubber	Chlorine	401 KAR 63:020	180 days after iss. of permit V-19-016	Method 26A	0.262 lb/hr	3.6×10^{-5} lb/hr	904.3 ton/day	CMN20200002	4/15/2021
013B EPN 013	None	NO_X	40 CFR 60.44b(a)(1)	Initial	Method 7E	0.2 lb/mmBtu	0.035 lb/mmBtu	191 mmBtu/hr	CMN20230003	2/8/2023 – 3/10/2023
013 B EPN 013	None	NO_X	401 KAR 51:017	Initial	Method 7E	0.037 lb/mmBtu	0.033 lb/mmBtu	200 mmBtu/hr	CMN20230004	2/7/2023
		CO			Method 3A	0.037 lb/mmBtu	0.0072 lb/mmBtu			
031 EPN 449	Absorber	VCl	40 CFR 61.62(b)	Every 5 years	Method 18	0.2 g/kg (0.4 lb/ton)	0.04 g/kg (0.07 lb/ton)	5.3 mmlb/day	CMN20230008	12/4/2023

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 Compliance Testing
033 EPN 530 Stack	Quench, Absorber, Packed Wet Scrubber	HAPs	40 CFR 63.113(a)(2)	Every 5 years	Method 18	98% or 20 ppm @ 3% O_2	1.42 ppm @ 3% O_2	5.29 mmlbs/day	CMN20240001	1/2/2024
		HCl, HF, HBr, Cl_2, Br_2	40 CFR 63.113(c)(1)(i)		Method 26 or 26A	99% (0.45) % Removal (kg/hr)	99.7 % Removal			
033 EPN 530 Inlet	None	HCl, HF, HBr, Cl_2, Br_2			Method 26 or 26A					
032 EPN 453 Stack	Packed Wet Scrubber	HAPs	40 CFR 63.113(a)(2)	Every 5 years	Method 18	98% or 20 ppm @ 3% O_2	1.18 ppm @ 3% O_2	5.29 mmlbs/day	CMN20240002	1/2/2024
		HCl, HF, HBr, Cl_2, Br_2	40 CFR 63.113(c)(1)(ii)		Method 26 or 26A	95% (0.45) % Removal (kg/hr)	99.90% Removal			
032 EPN 453 Inlet	None	HCl, HF, HBr, Cl_2, Br_2			Method 26 or 26A					

SECTION 4 – SOURCE INFORMATION AND REQUIREMENTS

Table A - Group Requirements:

None

Table B - Summary of Applicable Regulations:

Applicable Regulations	Emission Unit
401 KAR 51:017, Prevention of Significant Deterioration (PSD)	013B (EPN 013), 036 (EPN FUG), 012D (EPN 534A)
401 KAR 57:002, Section 2, 40 C.F.R. 61.60 to 61.71, (Subpart F), National Emission Standard for Vinyl Chloride.	032/033 (EPN 453/530) 009 (EPN 524), 036 (EPN FUG)
401 KAR 57:002, Section 2, 40 C.F.R. 61.240 to 61.247, Tables 1 to 2 (Subpart V), National Emission Standard for Equipment Leaks (Fugitive Emission Sources).	036 (EPN FUG)
401 KAR 57:002, Section 2, 40 C.F.R. 61.340 to 61.359, Appendices A to E (Subpart FF), National Emission Standard for Benzene Waste Operations.	026 (EPN 049), 028 (EPN EE-5)
401 KAR 59:010, New process operations	019A (EPN 849A), 040 (EPN 853), 894 (EPN 894), 034D (EPN 520A) 035 (EPN 457), 038 (EPN 459)
401 KAR 59:015, New indirect heat exchangers.	005 (EPN 009), 013B (EPN 013), CAP (EPN 437), 010 (EPN 514), 011 (EPN 526, 527), 012A (EPN 534), 012B (EPN 535), 012C (EPN 536), 012D (EPN 534A)
401 KAR 60:005, Section 2(2)(c), 40 C.F.R. 60.40b to 60.49b (Subpart Db), Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units.	005 (EPN 009), 013B (EPN 013)
401 KAR 60:005, Section 2(2)(r), 40 C.F.R. 60.110b to 60.117b (Subpart Kb), Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984.	032/33 (EPN 439, 609, 734, 735, 736)
401 KAR 60:005, Section 2(2)(bbb), 40 C.F.R. 60.480 to 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.	036 (EPN FUG)

SECTION 4 – SOURCE INFORMATION AND REQUIREMENTS (CONTINUED)

Table B - Summary of Applicable Regulations (Continued):

Applicable Regulations	Emission Unit
401 KAR 60:005, Section 2(2)(ppp), 40 C.F.R. 60.660 to 60.668 (Subpart NNN), Standards of Performance for Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations.	005 (EPN 009), 013B (EPN 013), 032 (EPN 453), 033 (EPN 530), 010 (EPN 514), 011 (EPN 526, 527), 012A (EPN 534), 012B (EPN 535), 012C (EPN 536), 012D (EPN 534A), 003 (EPN 011)
401 KAR 60:005, Section 2(2)(ttt), 40 C.F.R. 60.700 to 60.708 (Subpart RRR), Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes.	005 (EPN 009), 013B (EPN 013), 032 (EPN 453), 033 (EPN 530), 010 (EPN 514), 011 (EPN 526, 527), 012A (EPN 534), 012B (EPN 535), 012C (EPN 536), 012D (EPN 534A), 003 (EPN 011)
401 KAR 60:005, Section 2(2)(dddd), 40 C.F.R. 60.4200 to 60.4219, Tables 1 to 8 (Subpart IIII), Standards of Performance for Stationary Compression Ignition Internal Combustion Engines.	081A (EPN 081A), 082A (EPN 082A), 083 (EPN 083), 084 (EPN 084), 085 (EPN 085)
401 KAR 61:015, Existing indirect heat exchangers.	003 (EPN 011)
401 KAR 61:020, Existing process operations.	027 (EPN 052), 034A (EPN 519), 034C (EPN 521), 037 (EPN 458)
401 KAR 63:002, Section 2(4)(a), 40 C.F.R. 63.100 to 63.107, Tables 1 to 4 (Subpart F), National Emission Standards for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry.	027 (EPN 052), 032/033 (EPN 441, 442), 035 (EPN 457), 037 (EPN 458), 038 (EPN 459)
401 KAR 63:002, Section 2(4)(b), 40 C.F.R. 63.110 to 63.153, Tables 1 to 37, and Figure 1 (Subpart G), National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater.	032/033 (EPN 445, 446, EE-4, 439, 609, 734, 735, 736, TK-30-B2, 441, 442), 030 (EPN 438,454, 455), 039 (EPN 410), 031 (EPN 449), 032 (EPN 453), 033 (EPN 530)
401 KAR 63:002, Section 2(4)(c), 40 C.F.R. 63.160 to 63.183, Tables 1 to 4 (Subpart H), National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks.	036 (EPN FUG)
401 KAR 63:002, Section 2(4)(eeee), 40 C.F.R. 63.6580 to 63.6675, Tables 1a to 8, and Appendix A (Subpart ZZZZ), National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.	080 (EPN 080), 081A (EPN 081A), 082A (EPN 082A), 083 (EPN 083), 084 (EPN 084), 085 (EPN 085)

SECTION 4 – SOURCE INFORMATION AND REQUIREMENTS (CONTINUED)

Table B - Summary of Applicable Regulations (Continued):

Applicable Regulations	Emission Unit
401 KAR 63:002, Section 2(4)(iiii), 40 C.F.R. 63.7480 to 63.7575, Tables 1 to 13 (Subpart DDDDD), National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters.	005 (EPN 009), 013B (EPN 013), CAP (EPN 437), 010 (EPN 514), 011 (EPN 526, 527), 012A (EPN 534), 012B (EPN 535), 012C (EPN 536), 012D (EPN 534A), 003 (EPN 011)
401 KAR 63:010, Fugitive emissions.	013 (EPN 801)
401 KAR 63:015, Flares.	009 (EPN 524)
401 KAR 63:020, Potentially hazardous matter or toxic substances.	014A (EPN 813A), 015 (EPN 852), 017 (EPN 887), 017A (EPN 887A), 018 (FUG-CA-1), 020 (FUG-CA-2), 028 (EPN EE-5), 032/033 (EPN 453/530), 036 (EPN FUG)

Table C - Summary of Precluded Regulations:
NA

Table D - Summary of Non Applicable Regulations:

Non Applicable Regulations	Emission Unit
401 KAR 63:002, Section 2(4)(a), 40 C.F.R. 63.100 to 63.107, Tables 1 to 4 (Subpart F), National Emission Standards for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry.	014A (EPN 813A), 015 (EPN 852), 017 (EPN 887), 017A (EPN 887A)
401 KAR 63:002, Section 2(4)(c), 40 C.F.R. 63.160 to 63.183, Tables 1 to 4 (Subpart H), National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks.	
401 KAR 63:002, Section 2(4)(b), 40 C.F.R. 63.110 to 63.153, Tables 1 to 37, and Figure 1 (Subpart G), National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater.	014A (EPN 813A), 015 (EPN 852), 017 (EPN 887), 017A (EPN 887A) 032/033 (EPN 441, 442)
401 KAR 63:002, Section 2(4)(lll), 40 C.F.R. 63.2430 to 63.2550, Tables 1 to 12 (Subpart FFFF), National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing.	018 (EPN FUG-CA-1) 020 (EPN FUG-CA-2)
401 KAR 57:002, Section 2, 40 C.F.R. 61.240 to 61.247, Tables 1 to 2 (Subpart V) National Emission Standard for Equipment Leaks (Fugitive Emission Sources).	

SECTION 4 – SOURCE INFORMATION AND REQUIREMENTS (CONTINUED)

Table D - Summary of Non Applicable Regulations (Continued):

Non Applicable Regulations	Emission Unit
401 KAR 60:005, Section 2(2)(bbb), 40 C.F.R. 60.480 to 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.	018 (EPN FUG-CA-1) 020 (EPN FUG-CA-2)
401 KAR 60:005, Section 2(2)(q), 40 C.F.R. 60.110a to 60.115a (Subpart Ka), Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984.	030 (EPN 438, 454, 455)
401 KAR 60:005, Section 2(2)(r), 40 C.F.R. 60.110b to 60.117b (Subpart Kb), Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984.	
401 KAR 60:005, Section 2(2)(a), 40 C.F.R. 60.40 to 60.46 (Subpart D), Standards of Performance for Fossil-Fuel-Fired Steam Generators.	010 (EPN 514), 011 (EPN 526, 527), 012A (EPN 534), 012B (EPN 535), 012C (EPN 536), 012D (EPN 534A)
401 KAR 60:005, Section 2(2)(b), 40 C.F.R. 60.40Da to 60.52Da (Subpart Da), Standards of Performance for Electric Utility Steam Generating Units.	
401 KAR 60:005, Section 2(2)(c), 40 C.F.R. 60.40b to 60.49b (Subpart Db), Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units.	
401 KAR 60:005, Section 2(2)(d), 40 C.F.R. 60.40c to 60.48c (Subpart Dc), Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units.	
401 KAR 63:002, Section 2(4)(j), 40 C.F.R. 63.400 to 63.407, Table 1 (Subpart Q), National Emission Standards for Hazardous Air Pollutants for Industrial Process Cooling Towers.	019A (EPN 849A), 040 (EPN 853), 894 (EPN 894), 027 (EPN 052), 035 (EPN 457), 037 (EPN 458) 038 (EPN 459),
401 KAR 63:002, Section 2(4)(eeee), 40 C.F.R. 63.6580 to 63.6675, Tables 1a to 8, and Appendix A (Subpart ZZZZ), National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.	088 (EPN 088)

SECTION 4 – SOURCE INFORMATION AND REQUIREMENTS (CONTINUED)

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 January 31, 2020. The report lists the results of a performed AERMOD of potentially hazardous matter or toxic substances (Biphenyl, Carbon-tetrachloride, Chlorine, HCl, Chlorobenzene, Chloroform, Cresols, 1,2-Dichloroethane or EDC, Dichloroethyl Ether, 1,1-Dichloroethane, Dichloromethane, Dicyclopentadiene, Ethyl Benzene, Hexachloro-benzene, Phenol, Propylene, Styrene, Tetrachloroethylene, Toluene, 1,1,2-Trichloroethylene, Vinyl Chloride, Vinylidene Chloride (1,1-Dichloroethene), and Xylenes) 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 Chemical Corporation (Westlake), belong to the same two (2) digit major group code as described in the Standard Industrial Classification Manual [Major Group 28: Chemicals and Allied Products] 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-19-016 covers only Westlake Vinyls Inc. – Vinyls Plant.

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-13-041 R2	Minor Revision	APE20150002 APE20150005 APE20150007 APE20150009	7/21/2015 -- 10/2/2015 11/30/2015	3/22/2016	Minor Revisions
V-13-041 R3	Minor Revision	APE20160001 APE20160002	4/28/2016 6/22/2016	9/2/2016	Westlake Expansion Project and Boiler #2 Addition
V-13-041 R4	Minor Revision	APE20160003 APE20160004 APE20160005 APE20170001 APE20170004 APE20170005 APE20170006	8/23/2016 12/8/2016 1/23/2017 --- 5/3/2017 --- 9/25/2017	12/1/2017	LTC Reactor, Replacement and Addition of Emergency Fire Water Pumps and Generators, and Insignificant Activities
V-13-041 R5	Minor Revision	APE20170009	12/22/2017	3/25/2018	Conversion of EPN 437 to a Limited-Use Process Heater
V-19-016	Renewal	APE20180008	6/27/2019	11/13/2020	Renewal Permit
	Minor Revision	APE20180010	3/28/2019		Increase in chlorine production
	Minor Revision	APE20190001	3/29/2019		Catoxid Preheater no longer limited use
	Significant Revision	APE20190007	8/27/2019		2020 Expansion Project
	Minor Revision	APE20190010	10/11/2019		Updated salt usage for chlorine production increase
V-19-016 R1	Minor Revision	APE20200006	3/18/2021	7/5/2021	Temporary Salt Conveyor System (Alternate Operating Scenario)
	Minor Revision	APE20200009	3/18/2021		Permanent Salt Conveyor System

SECTION 6 – PERMIT APPLICATION HISTORY

Permit Number: V-19-016 R1 Activities: APE20200006, APE20200009

Application:	Received Date(s):	Application Complete Date(s):
APE20200006	November 4, 2020	March 18, 2021
APE20200009	November 24, 2020	March 18, 2021

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

502(b)(10)
APE20200005: The application received on October 5, 2020 was to remove the control device Atmospheric Scrubber (EPN 877) for the Ultra-Pure Brine (UP Brine) Tank and Ammonia Removal Tank. The Ammonia Tank does not store ammonia, but ultra-pure brine, and neither tanks contain either VOC or HAP that would be controlled by the scrubber. The tanks have been added to Section C in permit V-19-016 R1 as insignificant activities as EPN 896 and 897. No change in emissions occurred as a result in the change.

Description of Action:
APE20200006 (Minor Revision):

- On November 4, 2020, the Division received an application for a minor revision to install a temporary conveyor system (EPN 801a) at emission unit 013 (EPN 801) Salt Handling and Transfer Operations as an alternative operating scenario. The temporary conveyor system would move salt from barge unloading operations to the salt pile via temporary conveyors on ground and 0.076 miles of travel per loaded truck during times when the existing conveyor system is down for repair. The existing conveyor system and the temporary conveyor system shall not operate simultaneously and it has been demonstrated that the increase in particulate matter emissions associated with the temporary conveyor system will not exceed any significant emission rates as defined in 401 KAR 51:001.

PSD Criteria Pollutant	PM	PM_{10}	$PM_{2.5}$
Emissions Increase (tpy)	23.43	6.84	0.74
PSD Significance Emissions Rate (tpy)	25	15	10
Further PSD Review Needed.	No	No	No

APE20200009 (Minor Revision):

- On November 24, 2020, the Division received an application for a minor revision for a new permanent conveyor system to replace the existing conveyor system at emission unit 013 (EPN 801) Salt Handling and Transfer Operations. The conveyor system will consist of a series of conveyors and rather than one long conveyor like the existing system. There will also be no wet suppression used that was in place with the existing system. The use of wet suppression with the existing conveyor system has necessitated its replacement. Neither the existing conveyor system, temporary conveyor system, or new conveyor system will operate while the

others are in operation and it has been shown that the increase in emissions associated with the new conveyor system will not exceed any significant emission rates as defined in 401 KAR 51:001.

PSD Criteria Pollutant	**PM**	**PM_{10}**	**$PM_{2.5}$**
Emissions Increase (tpy)	9.09	4.30	0.69
PSD Significance Emissions Rate (tpy)	25	15	10
Further PSD Review Needed.	No	No	No

V-19-016 R1 Emission Summary				
Pollutant	2019 Actual (tpy)	Previous PTE V-19-016 (tpy)	Change (tpy)	Revised PTE V-19-016 R1 (tpy)
CO	164.00	522.36	--	522.36
NO_X	60.03	180.12	--	180.12
PT	24.46	47.92	3.76	51.68
PM_{10}	19.78	41.19	1.77	42.96
$PM_{2.5}$	14.22	32.98	0.26	33.24
SO_2	0.88	2.90	--	2.90
VOC	152.74	205.30	--	205.30
Greenhouse Gases (GHGs)				
Carbon Dioxide	212,757.4	531,182.97	--	531,182.97
Methane	8.17	542.39	--	542.39
Nitrous Oxide	1.71	5.97	--	5.97
CO_2 Equivalent (CO_2e)	213,470.9	546,521.23	--	546,521.23
Hazardous Air Pollutants (HAPs)				
1,2-Dichloroethane	21.556	25.094	--	25.094
Benzene	2.093	2.877	--	2.877
Carbon Tetrachloride	4.440	5.292	--	5.292
Chlorine	2.070	3.438	--	3.438
Chloroethane	1.518	2.912	--	2.912
Chloroform	1.152	1.324	--	1.324
Hydrochloric Acid	23.745	62.500	--	62.500
Naphthalene	3.756	5.215	--	5.215
Styrene	2.345	3.224	--	3.224
Toluene	0.392	0.547	--	0.547
Vinyl Chloride	25.439	30.776	--	30.776
Combined HAPs:	91.024	144.406	--	144.406

Number: V-19-016 Activities: APE20180008, APE20180010, APE20190001, APE20190007, APE20190010

Application:	Received Date(s):	Application Complete Date(s):
APE20180008	October 26, 2018	June 27, 2019
APE20180010	December 14, 2018	March 26, 2019
APE20190001	January 4, 2019	March 27, 2019
APE20190007	May 8, 2019	August 27, 2019
APE20190010	October 4, 2019	October 11, 2019

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

Off-Permit
APE20200003: The application received on March 19, 2020 was for the installation of an EDC startup heat exchanger in the Vinyl Chloride Monomer Unit to replace an existing heat exchanger that is being removed. The heat exchanger will utilize an additional 0.023 mmBtu/hr from boilers at the facility, but will not result in an increase in PTE. Furthermore, no additional piping equipment components will be added and there will not be any upstream or downstream impacts.

Off-Permit
APE20200002: The application received on February 28, 2020 was to replace the liquid chlorine manifold and associated piping components in the Chlor-Alkali Plant with larger diameter equipment to facilitate the decrease in time it takes to offload barges and railcars and to alleviate intermittent high-pressure chlorine transfer events in the plant. No increase in emissions were expected from this project.

502(b)(10)
APE20200001: The application received on January 24, 2020 was to replace the current vinyl chloride (VCl) railcar unloading system which used nitrogen to force VCl out of railcars with a system that uses pressurized VCl vapor to force VCl out of the railcars, which is then pulled back out of the railcar. By doing this, no nitrogen from the railcars will need to be sent to the incinerator before the railcars leave the facility. Two (2) VCL compressors, knock out pots and other piping and valve components will be installed at the facility resulting in 1.2 tpy of VCl from the addition of pipeline equipment associated with EPN FUG.

Off-Permit
APE20190013: The application received on November 4, 2019 was to change the diameter and location of the stack for the Catoxid Reactor Startup Vent (EPN 407). The stack diameter was increased from 8 inches to 12 inches, with all other physical stack data remaining the same, resulting in a lower gas steam exit velocity of 218 ft/sec. No emissions changed due to the change in stack diameter.

Off-Permit
APE20190012: The application received on October 18, 2019 was for the installation of new combustion air blowers and motors at the primary incinerator. There are new fugitive components associated with the project, but none of the components are in VOC service. Therefore, the project has no effect on emission unit 036 (EPN FUG or FUG-MON-H).

502(b)(10)
APE20190011: The application received on October 17, 2019 was for the repair/replacement of components of Cooling Towers 1B and 3 (EPNs 458 and 052), including the installation of new high efficiency mist eliminators on EPN 458. The new mist eliminators are guaranteed by the manufacturer to reduce drift loss to less than 0.001%.

Off-Permit
APE20190009: The application received May 15, 2019 was for the installation of a heat exchanger requiring an additional 0.0228 mmBtu/hr from the boilers at the facility. The heat exchanger located at the high-pressure nitrogen supply in the VCM Plant will provide heated nitrogen to prevent localized hydrochloric acid (HCl) dew formation that would corrode and damage equipment if its formation were not mitigated. There will be no increase in PTE due to the project and it has been shown that the increase in actual emissions will not exceed any significant emission rates defined in 401 KAR 51:001.

502(b)(10)
APE20190008: The application received on May 13, 2019 was for the installation of a temporary heat exchanger requiring an additional 1.5 mmBtu/hr from the boilers at the facility. The heat exchanger and associated fugitive components will be located on the recycle water loop to the #4 Oxy Hot Quench in the VCM Plant to control hexachlorobenzene impurities. There will be a 0.03 tpy increase in the PTE of VOC from the fugitive components, but no increase in the PTE from the boiler. It has been shown that the increase in actual emissions will not exceed any significant emission rates defined in 401 KAR 51:001.

502(b)(10)
APE20190004: The application received on March 13, 2019 was for the installation of an insignificant urea tank in the wastewater treatment area.

502(b)(10)
APE20190002: The application received on February 19, 2019 was for the installation of a lights column feed cooler and associated piping components on the North/South Lights Column in the VCM Unit resulting in an increase in efficiency at the EDC cracking furnace without any increases in production or debottlenecking. An additional 4.0 mmBtu/hr from Boiler #2 to maintain lights column operation results in an increase in actual emissions, but not PTE, and the additional fugitive components results in an PTE increase of VOC emissions. It has been shown that the increase in actual emissions will not exceed any significant emissions rates pursuant to 401 KAR 51:017.

Off-Permit
APE20180005: The application received on May 30, 2018 updated the represented production rates and project aggregation submitted to the Division on April 19, 2016 and subsequent applications to better reflect the anticipated production in the Monomers Plant than the rates included in the original application.

502(b)(10)
APE20180003: The application received on May 7, 2018 was for the addition of a portable, 540 hp diesel engine-driven air compressor with a 240 gallon diesel tank and additional skid-mounted 1,000 gallon diesel tank.

Off-Permit
APE20180002: The application received on March 22, 2018 was for updates to the existing South Cracking Cooling Water Tower CT-2 (EPN 459) to improve integrity of the cooling tower and to replace the existing mist eliminators with more efficient eliminators.

502(b)(10)
APE20180001: The application received on January 29, 2018 was for an addendum to a previously submitted minor revision application received on July 5, 2016 for the installation of a Low Temperature Chlorination (LTC) reactor and a hiboils column in Westlake's Monomers production unit. The addendum was to revise the existing High Temperature Direct Chlorination (HTDC) and LTC reactor throughputs and emission calculations to aggregate with the April 2016 site expansion.

Description of Action:
APE20180008 (Renewal):

- EPN 813 Sodium Hypochlorite Tower has been removed from the permit pursuant to a minor permit application submitted in May 2015.

- The description for the EDC Cracking Furnace #5 has been updated to remove "proposed" from the construction date as the unit has now been constructed.

- The emission unit descriptions of EPNs 457, 458, and 459 have been modified to include CT-1A, CT-1B, and CT-2 respectively.

- Several fugitive leak components counts attributed to EPN FUG have been updated. Gas/Vapor, light liquid, and heavy liquid flange emission factors and control efficiencies have been updated using the respective definitions of a leak from the Air Permit Technical Guidance for Chemical Sources Fugitive Guidance, TCEQ (APDG 6422v.2, Revised 06/2018).

- The PTE calculations for EPN EE-5 and EPN 049 have been updated using the correct design flow rates.

- Emission calculations from the cooling towers at the facility have been updated based on the correct manufacture guarantees for mist eliminators and PM/PM_{10}/$PM_{2.5}$ emission factors now reflect the calculation methodology from "Calculating Realistic PM10 Emissions from Cooling Towers," Abstract No. 216, Session No. AM-1b, Joel Reisman and Gordon Frisbie, Greystone Environmental Consultants, Inc., 4/11/2002.

- VOC emissions have been removed from EPN 849A and EPN 853 as the cooling water in the Chlor-Alkali Plant is limited to non-VOC service.

- Cooling tower permit requirements have been updated to reflect the applicability of 401 KAR 59:010 or 401 KAR 61:020 rather than 401 KAR 63:010.

- Several changes have been made to Section D (Insignificant Activities) of the permit including:
  - Removing EPN 412 No.3 Tank
  - Removing EPN 601 Sulfuric Acid 1
  - Removing EPN 602 Sulfuric Acid 2
  - Changing the description of EPN 826, Sulfuric Acid Truck Loading from 813 to 813A
  - Changing the volume of EPN 830 #1 Caustic Tank from 896,000 gallons to 845,000 gallons
  - Removing EPN 847 Diesel Fuel Tank

- Several typographical errors in the permit have been addressed and fixed as appropriate.

- Based on a 30-day compliance test from 5/9/2017 to 6/12/2017 pursuant to 40 CFR 60.44b(a)(1), the emission factor for NOx at Boiler #2 (EPN 009) has been updated to 0.037 lb/mmBtu.

- The pilot gas flowrate for the Vinyl Chloride Flare (EPN 524) was updated to accurately reflect the actual pilot gas flowrate at the facility.

- Testing requirements have been added to emission units which have applicable emissions or operating limitations. EPN 877 must be tested within 180 days of the issuance of the final permit V-19-016. EPNs 449, 453, and 530 must be tested within 180 days of the issuance of the final permit V-19-016 or within 5 years of the last performance test approved by the Division, whichever is later.

APE20180010 (Minor Revision Incorporated with Renewal)

- The Division received the Westlake Vinyls, Inc. – Vinyls Plant application for a minor revision to permit V-13-041 R5 for the installation of additional equipment to increase the chlorine production from 900 tons per day (tpd) to 1,200 tpd on December 14, 2018. The change also impacts the downstream equipment in the Chlor-Alkali Plant.

- The salt handling (EPN 801A/B/C/D) will increase from 620,000 tpy to 740,220 tpy. The increase in the throughput of the existing equipment was accomplished without any change in equipment.

- A new cooling tower (EPN 894) will be installed and will circulate 12,000 gallons per min of cooling water and will include a mist eliminator for control of particulate matter.

- Fugitive leak components in the Chlor-Alkali Plant (EPN FUG-CA-1) and (EPN FUG-CA-2) have been updated.

- The cell room building will be expanded and the adjacent fire water building will be closed with the associated fire water pumps (EPNs 082A and 083) being moved.

- The following Insignificant Activities will be added to Section C of the permit:
  - Chilled Water Machine
  - Additional set of head Tanks (HCl and H_2SO_4)
  - Caustic Tank

- Additional non emitting equipment including a new fire water tank, rectifier, large blowdown tanks, and an upgraded dilution air system will be added.

- Projected Actual Emissions, and Could Have Accommodated Emissions have been calculated and used to calculate the Net Project Adjusted Emission Increase using the Baseline Actual Emissions from January 2016 to December 2017 as follows:

PSD Criteria Pollutant	CO	NO_x	SO_2	PM	PM_{10}	$PM_{2.5}$	VOC
Emissions Increase	0.665	36.50	0.009	5.69	2.86	0.51	0.75
PSD Significance Emissions Rate	100	40	40	25	15	10	40
Further PSD Review Needed.	No	No	No	No	No	No	No

Based on the table above, the project does not trigger further review under 401 KAR 51:017, Prevention of Significant Deterioration (PSD). Furthermore, the chlorine expansion has no impact on the monomers plant or VCM production. The chlorine at the Chlor-Alkali Plant is primarily used to produce HCl to be sold as product and in the direct chlorination reactors.

Pursuant to 401 KAR 51:017, Section 16. Source Obligation, to preclude 401 KAR 51:017, the permittee shall monitor and calculate annual NOx emissions associated with the increased chlorine production and maintain a record of the annual emissions in tons per year on a calendar year basis for five (5) years following resumption of regular operations after the modification. The source shall submit a report to the Division if:

i. The annual NOx emissions, in tons per year, from this proposed project exceeds the baseline actual emissions by a significant amount; and
ii. NOx emissions differ from the projected actual emissions as submitted in the application for the modification related to the increase in chlorine production.

APE20190001 (Minor Revision Incorporated with Renewal)

- The Division received the Westlake Vinyls, Inc. – Vinyls Plant application for a minor revision to permit V-13-041 R5 to modify the hours of operation of the Catoxid Air Preheater (EPN 437) from limited use (876 hours) to non limited use (8760 hours) on January 4, 2019. The change would result in an increase in natural gas combustion emissions but would not affect the emissions from any other emission units. Also, since EPN 437 will no longer be a limited use heater, and pursuant to 40 CFR 63, Subpart DDDDD, the permittee will be required to conduct biennial tube ups of the less than 10 mmBtu/hr process heater.

- The table below shows that the modification of the Catoxid Air Preheater 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	2.82	3.36	0.02	0.26	0.26	0.26	0.18
PSD Significance Emissions Rate	100	40	40	25	15	10	40
Further PSD Review Needed	No	No	No	No	No	No	No

APE20190007 (Significant Revision/PSD 2020 Expansion Project Incorporated with Renewal)

- The Division received the Westlake Vinyls, Inc. – Vinyls Plant application for a significant revision to permit V-13-041 R5 for the installation of a new boiler (Boiler #6) equipped with low NOx burners (EPN 013), a new EDC Cracking Furnace #3A (EPN 534A), and Monitored

and Non-Monitored Fugitives in the Monomers Area of the facility to increase the monomers production from 1.58 billion pounds per year to 1.9 billion pounds per year on May 8, 2019.

- Boilers #1, #3, and #4 (EPNs 008, 010, and 011) and the existing EDC Cracking Furnace #3 (EPN 534) will be permanently decommissioned. However Boilers #1, #4, and #6 will be able to operate simultaneously for 180 days while being limited to a combined 201.58 mmBtu/hr firing rate on a 24-hour average basis.

- Each indirect heat exchanger at the facility (boilers and cracking furnaces) will be limited to both Maximum Hourly and Annual Average firing rates on 24-hour and 12-month rolling average basses respectively.

- The significant revision also impacts several upstream and downstream equipment in the Monomers Plant with no changes to each equipment's PTE. The new equipment is summarized on Table 1 below, and the upstream and downstream impacts are summarized on Table 2. Any increases in emissions from the significant revision shall only occur upon issuance of the final permit V-19-016.

EU	EPN	Equipment	Description of New Equipment
013B	013	Boiler #6	New boiler with a low NOx burners and oxygen trim system operated on a mixture of natural gas, process gas, and hydrogen.
036	FUG	FUG-MON-H	New pipeline components at the Monomers plant to which 40 CFR 63, Subpart H, 40 CFR 60, Subpart VV; or 40 CFR 61, Subparts F or V, are applicable.
036	FUG	FUG-MON	New pipeline components in VOC service at the Monomers plant to which 40 CFR 63, Subpart H, 40 CFR 60, Subpart VV; or 40 CFR 61, Subparts F or V, are not applicable.
		FUG-MON-NG	New pipeline components in natural gas service at the Monomers plant to which 40 CFR 63, Subpart H, 40 CFR 60, Subpart VV; or 40 CFR 61, Subparts F or V, are not applicable.
012D	534A	EDC Cracking Furnace #3A	New more efficient EDC Cracking Furnace #3A rated at the same rating as the existing EDC Cracking Furnace #3 but with low NOx burners and a higher cracked EDC yield than the existing unit. The unit is considered a replacement unit pursuant to 401 KAR 51:001 Section 1(208).

EU	EPN	Equipment	Description of Impacts
030	438	No. 1 EDC Shore Tank	Increased Utilization, No PTE Change
030	454	No. 5 EDC Shore Tank	
030	455	No. 6 EDC Shore Tank	
039	410	Solvesso Storage Tank (TK-33-B2)	
032	453	Oxy Thermal Incinerator	
033	530	Primary Thermal Incinerator	
010	514	South Cracking Furnace #13	
011	526	North Cracking Furnace 1A	
011	527	North Cracking Furnace 2A	
012B	535	EDC Cracking Furnace #4	
012C	536	EDC Cracking Furnace #5	
034A	519	North Cracking-Decoking Pots	
034B	520	South Cracking-Decoking Pots	
034C	521	East Cracking-Decoking Pots	
	402A	S Syn Neutralizing Amine BL1544	Insignificant Activities with Increased Utilization, No PTE Change
	402B	E Syn Optimeen Tank	
	402C	N Syn Neutralizing Amine BL1544	
	404	East Catalyst System	
	406	Catoxid Kerosene Tank	
	408	NSYN Kerosene Tank	
	448	South Catalyst System	
	452	S Syn Brine Storage Tank (3,760 gal)	
	460	P-7206 Tank (2,000 gal)	
	461	S Syn Lubricant Oil Tank (264 gal)	
	462	Propylene Glycol Tank (330 gal)	
	463	Seal Oil Tote (359 gal)	
	464	N Cracking Lubricant Oil Tote (264 gal)	
	465	Tank Farm Lubricant Oil Tote (117 gal)	
	466	466 A Oxy Reactor Catalyst Addition	
	467	B Oxy Reactor Catalyst Addition	
	468	#4 Oxy Reactor Catalyst Addition	
	469	Catoxid Catalyst Addition	
	470	HTDC Ferric Chloride Addition	
	607	Conococo R&O Oil 68	
	069	Polymer Tank (4,000 gal)	
	070	WW Storage Tank - Settling Tank	
	073	WW Tank - Carbon Filter Backwash	
	075	Mix Tank Bag Unloading	
	076	Sulfite Tank Bag Unloading	
	079	Diesel Storage Tank	

EU	EPN	Equipment	Description of New Equipment
001	008	Boiler #1	Shutdown and decommission of existing boiler
002	010	Boiler #3	Shutdown and decommission of existing boiler
003	011	Boiler #4	Shutdown and decommission of existing boiler
012A	534	EDC Cracking Furnace #3	Shutdown and decommission of existing furnace

Westlake Vinyls, Inc. – Vinyls Plant, Westlake Chemical OpCo, LP, and Westlake Vinyls, Inc. - PVC Plant are all subsidiaries of Westlake Chemical Corporation (Westlake), belong to the same two (2) digit major group code as described in the Standard Industrial Classification Manual [Major Group 28: Chemicals and Allied Products] 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. The calculated emission increase for the proposed changes associated with the project and the Federal NSR PSD applicability determination for a major modification at the affected major source are shown in Tables 4 through Table 6, and the final determination is summarized in Table 7. Westlake Vinyls Inc. - Vinyls Plant, Westlake Chemical OpCo, LP, and Westlake Vinyls Inc. - PVC Plant are also a single major source as defined by 401 KAR 52:020, Title V Permits.

Project Emission Increase Calculations

Pursuant to 401 KAR 51:001, Section 1 Definitions (144)(a), a net emissions increase for any regulated NSR pollutant emitted by a major stationary source means the amount by which the sum of an increase in emissions from a particular physical change or change in method of operation at a stationary source as calculated pursuant to 401 KAR 51:017, Section 1(4), or 401 KAR 51:052, Section 1(2); and any other increases and decreases in actual emissions at the major stationary source that are contemporaneous with the particular change and are otherwise creditable exceeds zero. Generally, baseline actual emissions are subtracted from the projected actual emissions.

Pursuant to 401 KAR 51:001, Section 1 Definitions (20)(b), "Baseline actual emissions" means the rate of emissions, in tons per year, of a regulated NSR pollutant, that the unit actually emitted during any consecutive twenty-four (24) month period selected by the owner or operator within the ten (10) year period beginning on or after November 15, 1990, and immediately preceding the earlier of the date the owner or operator begins actual construction of the project or the date a complete permit application is received by the cabinet for a permit required under 401 KAR 51:017 or 51:052. The Baseline Actual emissions used to calculate the net emissions increase of this project are from January 2016 to December 2017 for all NSR pollutants.

Projected actual emissions (PAE) are calculated by multiplying the baseline emissions by the percent production increase. If the percent increase exceeds the potential to emit (PTE) for the emission unit, then the PTE value is used for the PAE (new units are set to PTE).

Table 4: Project Emission Increases (tpy)*

	CO	NO_X	SO_2	PM	PM_{10}	$PM_{2.5}$	VOC	CO_2e
Westlake Chemical OpCo, LP	266.92	57.08	0.93	15.76	15.68	12.95	31.68	131,267
Westlake Vinyls, Inc. – Vinyls Plant	87.11	80.77	1.33	15.27	15.22	15.22	24.19	278,785
Westlake Vinyls, Inc. – PVC Plant	19.11	14.31	0.14	11.21	2.14	1.79	15.14	26,854
Totals	373.14	152.16	2.39	42.24	33.04	29.96	71.01	436,906

*Emission increase values are calculated by taking the difference between the PAE and BAE emissions on an individual emission unit basis at each facility.

Netting Analysis for NO_X

Westlake has 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 proposed project is not considered a significant increase to trigger further analysis under PSD. All projects at Westlake Chemical OpCo, LP within the contemporaneous period were only increases in utilization, and thus there are no creditable NO_X emissions increases or decreases at this facility. The contemporaneous increases for the Westlake Vinyls, Inc. – Vinyls Plant are shown below in Table 5. Creditable contemporaneous period increases for the Westlake Vinyls, Inc. – PVC Plant are only due to the installation of an emergency generator in November 2015 and are reflected in the NO_X netting analysis summary shown in Table 6.

Table 5: NO_X Netting Analysis Westlake Vinyls, Inc. – Vinyls Plant

EU	EP	Physical or Operational Change Due to Project	Emission Increase (tpy)*
082A	082A	September 2015, #3 Fire Water Pump Engine was installed	0.40
005	009	May 2016, Boiler #2 was installed	32.67
004	012	May 2016, Boiler #5 was decommissioned	-3.24
081A	081A	November 2016, #2 Fire Water Pump Engine was installed	0.34
084	084	September 2016, Emergency Firewater Generator was installed	1.38
085	085	March 2017, Emergency Generator was installed	1.38
CAP	437	October 2017, Catoxid Air Preheater hours of operation increased from 320 hr/yr to 876 hr/yr	0.15
088	088	May 2018, Portable Diesel Engine was installed	0.52
CAP	437	January 2019, Hours of operation increased from 876 to 8760 hr/yr	3.52
001	008	2020 Expansion Project, Boiler #1 is being decommissioned	-56.08
002	010	2020 Expansion Project, Boiler #3 is being decommissioned	-26.91
003	011	2020 Expansion Project, Boiler #4 is being decommissioned	-144.28

*Westlake has opted to use January 2012 through December 2013 as the basis for the baseline actual emissions for the netting analysis.

Table 6: NO_X Netting Analysis Summary

Facility	Contemporaneous Emission (tpy)
Westlake Vinyls, Inc. – Vinyls Plant	-190.14
Westlake Chemical OpCo, LP	0
Westlake Vinyls, Inc. – PVC Plant	0.19
Total from project emissions increase	152.16
Total Contemporaneous Increases/Decreases	-189.95
Total net emissions increase	-37.79

Table 7: PSD Applicability Evaluation Summary*

Pollutant	Project Increases (tpy)	SER Level (tpy)	PSD Netting Conducted? (Yes/No)	Is PSD Review Required? (Yes/No)
NO_X	152.16	40	Yes	No
CO	373.14	100	No	Yes
VOC	71.01	40	No	Yes
SO_2	2.39	40	No	No
PM	42.24	25	No	Yes
PM_{10}	33.04	15	No	Yes
$PM_{2.5}$	29.96	10	No	Yes
GHG	436,906	75,000	No	Yes

* Summary is for all three facilities combined (OpCo, Vinyls and PVC) due to single source determination

BACT Applicability:
Each of the proposed new or modified units to be installed as part of Westlake's 2020 Expansion Project that generate any criteria pollutant (PM, PM_{10}, $PM_{2.5}$, CO, or VOC) emissions or GHG emissions subject to PSD review require BACT review, because the project increases are greater than the significant emission rate (SER) thresholds. Existing emission units at which a net emission increase occurs as a result of a physical change or a change in the method of operation in the unit (per 401 KAR 51:017 Section 8(3)(b)) require a BACT analysis.

Emission Unit 012D EDC Cracking Furnace #3A (EPN 534A)
Westlake Vinyls, Inc. – Vinyls Plant submitted a BACT analysis for the proposed cracking furnace, where proposed control technologies were identified and discussed. The following sections discuss the control options listed in the RBLC as BACT for ethylene furnaces.

BACT analysis for Carbon Monoxide (CO) at EDC Cracking Furnace #3A:
Control options for CO generally consist of fuel specifications, combustion modification measures, or post-combustion controls.

Identify All Control Technologies
Use of Natural Gas

CO emissions with natural gas fired equipment are generally the lowest emission rates achievable because of the combustion efficiency of natural gas. Natural gas is processed to meet certain specifications, including methane content, heating value and sulfur content, that affect combustion efficiency.

Catalytic Oxidation

Catalytic oxidation of CO gases requires a catalyst bed located in the furnace exhaust. Reduction efficiencies of 90% are typical for CO.

Proper Burner Design and Good Combustion Control Practices

Proper burner design to achieve good combustion efficiency will minimize the generation of CO. Good combustion efficiency relies on both hardware design and operating procedures. A firebox design that provides proper residence time, temperature, and combustion zone turbulence, in combination with proper control of air-to-fuel ratio, is an essential element of a low-CO technology.

Limiting fuel usage at the furnace, ensures that the maximum production efficiency is achieved, while following manufacturer recommendations for burner operation assures that the guaranteed emissions from the furnace will be achieved. There are no detrimental environmental or energy effects related to this control option.

Good Combustion Practices for the furnace include:

1. Calibrations of the excess oxygen analyzer as per the manufacturer's recommendations;
2. Calibrations and filter checks on the fuel gas analyzer as per the manufacturer's recommendations;
3. Calibration of the fuel gas flow meter as per the manufacturer's recommendations;
4. Inspect the burners and clean / replace components as per the manufacturer's recommendations;
5. Inspect the burner flame pattern and adjust as per the manufacturer's recommendations; and
6. Inspect the furnace, insulation, piping and refractory and repair / replace components as per the manufacturer's recommendations.

Eliminate Technically Infeasible Options

Use of Natural Gas

The sole use of natural gas is not feasible for the cracking furnace. If fuel gas and process gas are not used in the furnace, the fuel is required to be flared, increasing the overall emissions from the system, and reducing the overall usage efficiency of the ethylene plant.

Catalytic Oxidation

Catalytic oxidation of CO gases requires a location in the exhaust path where flue gas temperatures range from 800 to 1,100°F. The exhaust from the furnace is approximately 1,400°F and is used to preheat the EDC Feed to the furnace. The temperature of the exhaust after the heat exchanger is between 400-500°F, which is not warm enough for the catalytic oxidation to be effective; therefore, catalytic oxidation is not technically feasible.

Selection of BACT

Westlake Vinyls, Inc. – Vinyls Plant will utilize clean, gaseous fuel and good combustion practices with no add-on controls, and numerical emissions limits of 0.039 lb/mmBtu and 18.22 tons per year on a 12-month rolling basis of CO as BACT for EDC Cracking Furnace #3A EPN 534A.

BACT analysis for PM, PM10, and PM2.5 at EDC Cracking Furnace #3A:

Control options for particulate matter generally consist of fuel specifications, combustion modification measures, or post-combustion controls.

Identify All Control Technologies

Use of Natural Gas

PM emissions with natural gas fired equipment are generally the lowest emission rates achievable because of the combustion efficiency of natural gas. Natural gas is processed to meet certain specifications, including methane content, heating value and sulfur content, that affect combustion efficiency.

Post Combustion PM Control

The typical controls for post-combustion particulate matter are baghouses, electrostatic precipitators (ESP), cyclones, and scrubbers.

Proper Burner Design and Good Combustion Control Practices:

Proper burner design to achieve good combustion efficiency will minimize the generation of particulates. A firebox design that provides proper residence time, temperature, and combustion zone turbulence, in combination with proper control of air-to-fuel ratio, is an essential element of low PM generation.

Proper design of burner and firebox components in the heaters and boilers will provide the proper air-to-fuel ratio, proper residence time, temperature, and combustion zone turbulence essential to maintain low particulate emission levels.

Good Combustion Practices for furnaces include:

1. Calibrations of the excess oxygen analyzer as per the manufacturer's recommendations;
2. Calibrations and filter checks on the fuel gas analyzer as per the manufacturer's recommendations;
3. Calibration of the fuel gas flow meter as per the manufacturer's recommendations;
4. Inspect the burners and clean / replace components as per the manufacturer's recommendations;
5. Inspect the burner flame pattern and adjust as per the manufacturer's recommendations; and
6. Inspect the furnace, insulation, piping and refractory and repair / replace components as per the manufacturer's recommendations.

Eliminate Technically Infeasible Options

Use of Natural Gas

The sole use of natural gas is not feasible for the cracking furnace. If fuel gas and process gas are not used in the furnaces, the fuel is required to be flared, increasing the overall emissions from the system, and reducing the usage efficiency of the plant.

Post Combustion PM Control

ESPs are used exclusively on very high volume, high particulate loaded vents, commonly associated with combustion of solid fuels such as coal. Likewise, cyclones and scrubbers are used only in situations with high flows and high PM loadings. Combustion of gaseous fuels does not fit into this category; therefore, add-on controls are not a technically feasible option for the furnace.

Selection of BACT

Westlake Vinyls, Inc. – Vinyls Plant will utilize clean, gaseous fuel and good combustion practices with no add-on controls, and numerical emissions limits of 0.005 lb/mmBtu and 2.34 tons per year

on a 12-month rolling basis of $PM/PM_{10}/PM_{2.5}$. The burner manufacturer expects 0.002 lb $PM/PM_{10}/PM_{2.5}$/mmBtu from the burner.

BACT analysis for VOC at EDC Cracking Furnace #3A:
Control options for VOC generally consist of fuel specifications, combustion modification measures, or post-combustion controls.

Identify All Control Technologies
Use of Natural Gas:

VOC emissions with natural gas fired equipment are generally the lowest emission rates achievable because of the combustion efficiency of natural gas. Natural gas is processed to meet certain specifications, including methane content, heating value and sulfur content, that affect combustion efficiency.

Catalytic Oxidation:

Catalytic oxidation of VOC requires a catalyst bed located in the furnace exhaust. Reduction efficiencies of 90% are typical for VOC.

Proper Burner Design and Good Combustion Control Practices:

Proper burner design to achieve good combustion efficiency will minimize the generation of VOC. Good combustion efficiency relies on both hardware design and operating procedures. A firebox design that provides proper residence time, temperature, and combustion zone turbulence, in combination with proper control of air-to-fuel ratio, is an essential element of a low- VOC technology.

Proper design of burner and firebox components in the heaters and boilers will provide the proper air-to-fuel ratio, proper residence time, temperature, and combustion zone turbulence essential to maintain low VOC emission levels. Because proper burner design and operation promotes low VOC emissions, there are no detrimental environmental or energy effects related to this control option.

Good Combustion Practices for furnaces include:

1. Calibrations of the excess oxygen analyzer as per the manufacturer's recommendations;
2. Calibrations and filter checks on the fuel gas analyzer as per the manufacturer's recommendations;
3. Calibration of the fuel gas flow meter as per the manufacturer's recommendations;
4. Inspect the burners and clean / replace components as per the manufacturer's recommendations;
5. Inspect the burner flame pattern and adjust as per the manufacturer's recommendations; and
6. Inspect the furnace, insulation, piping and refractory and repair / replace components as per the manufacturer's recommendations.

Eliminate Technically Infeasible Options
Use of Natural Gas:

The sole use of natural gas is not feasible for the cracking furnace. If fuel gas and process gas are not used in the furnaces, the fuel is required to be flared, increasing the overall emissions from the system, and reducing the usage efficiency of the plant.

Catalytic Oxidation:

Catalytic oxidation of VOC gases requires a location in the exhaust path where flue gas temperatures range from 800 to 1,100°F. The exhaust from the furnace is approximately 1,400°F and is used to preheat the EDC Feed to the furnace. The temperature of the exhaust after the heat exchanger is between 400-500°F, which is not warm enough for the catalytic oxidation to be effective; therefore, catalytic oxidation is not technically feasible.

Selection of BACT

Westlake Vinyls, Inc. – Vinyls Plant will utilize clean, gaseous fuel and good combustion practices with no add-on controls, and numerical emissions limits of 0.0054 lb /mmBtu and 2.52 tons per year of VOC on a 12-month rolling basis.

BACT analysis for GHG at EDC Cracking Furnace #3A:

Control strategies for GHG generally consist of proper combustion design and control, use of gaseous fuels, improved combustion measures (i.e., combustion tuning, optimization, and installation of instrumentation and controls); insulation; and operational monitoring and proper maintenance to minimize air infiltration.

Identify All Control Technologies

Carbon Capture with Transportation and Dedicated Sequestration:

Carbon capture and sequestration (CCS) can make a contribution to the overall GHG reduction effort by reducing the emissions of CO_2 from the use of fossil fuels.

Selection of Low-Carbon, Gaseous Fuels:

The use of gaseous fuels with low carbon content and high heat intensity is an appropriate BACT for GHG.

Proper Furnace and Burner Design:

The efficiency of the furnace will have an impact on the overall efficiency of the facility and thus an impact on total GHG emissions. Efficient design improves mixing of fuel and creates more efficient heat transfer. In general, a more energy efficient combustion technology burns less fuel and reduces the production of GHG and other regulated air pollutants.

The proposed cracking furnace will be designed to optimize combustion efficiency. Maximizing combustion efficiency reduces the consumption of fuel by optimizing the quantity of usable energy transferred from the fuel to the process. Proper design of burner and firebox components in the furnace will provide the proper air-to-fuel ratio, proper residence time, temperature, and combustion zone turbulence essential to maintain low CO_2 emission levels.

Good Combustion Practices:

The use of good combustion practices can minimize the potential GHG emissions associated with incomplete combustion. Good combustion practices typically entail introducing the proper ratio of combustion air to the fuel, maintaining a minimum temperature in the firebox of the combustor, or a minimum residence time of fuel and air in the combustion zone. By employing good combustion practices, GHG emissions may be greatly reduced.

Preventative maintenance of the furnaces includes calibration of fuel gas flow meters and oxygen control analyzers, cleaning of burner tips and cleaning of convection section tubes.

These activities insure maximum thermal efficiency is maintained.

Good Combustion Practices for furnaces include:
1. Calibrations of the excess oxygen analyzer as per the manufacturer's recommendations;
2. Calibrations and filter checks on the fuel gas analyzer as per the manufacturer's recommendations;
3. Calibration of the fuel gas flow meter as per the manufacturer's recommendations;
4. Inspect the burners and clean / replace components as per the manufacturer's recommendations;
5. Inspect the burner flame pattern and adjust as per the manufacturer's recommendations; and
6. Inspect the furnace, insulation, piping and refractory and repair / replace components as per the manufacturer's recommendations.

Design a Furnace with a Specific Thermal Efficiency (TE) Guaranteed by the Furnace Manufacturer

Designing a cracking furnace with a high TE is environmentally and economically beneficial to reduce fuel use, and thus GHG emissions.

Eliminate Technically Infeasible Options

Carbon Capture with Transportation and Dedicated Sequestration:

Most of the technologies needed for CCS are being used in a variety of industries but are yet to be widely applied to industry at a commercial scale. Because CCS is not commercially available, it is not a feasible control option.

Selection of Low-Carbon, Gaseous Fuels:

Because the sole use of natural gas is not a feasible option for the cracking furnace, as it reduces the overall usage efficiency of the ethylene plant, only process gas will be combusted.

Selection of BACT

To minimize GHG emissions, Westlake Vinyls, Inc. – Vinyls Plant will utilize the following control methods:
1. Use of low-carbon gaseous fuels (NG, process gas and hydrogen fuels);
2. Good heater design, including insulation and minimization of potential for air infiltration;
3. Good combustion practices and proper burner design and operation;
4. Proper furnace operation and maintenance;
5. Preheating of combustion gases through a heat recovery system to reduce heat load and fuel consumption at the furnace; and
6. Designing a furnace with a minimum TE as guaranteed by manufacturer for each fuel used and conducting thermography while developing a maximum flue gas temperature to ensure the minimum TE.

Additionally, there is a numerical emissions limit of 54,920 tons per year on a 12-month rolling basis of CO_2e while burning natural gas.

Emission Unit 012D EDC Cracking Furnace #3A (EPN 534A) Summary

Pollutant	BACT Determination	BACT Limit
CO	1. Good combustion practices and proper operation and maintenance. 2. Use of fuel gas and natural gas fuel.	0.039 lb/mmBtu and 18.22 tons per year on a 12-month rolling basis
PM $PM_{2.5}$ PM_{10}	1. Good combustion practices and proper operation and maintenance. 2. Use of fuel gas and natural gas fuel.	0.005 lb/mmBtu and 2.34 tons per year on a 12-month rolling basis
VOC	1. Good combustion practices and proper operation and maintenance. 2. Use of fuel gas and natural gas fuel.	0.0054 lb/mmBtu and 2.52 tons per year on a 12-month rolling basis
GHG (CO_2e)	1. Good combustion practices and proper operation and maintenance. 2. Use of fuel gas and natural gas fuel. 3. Improved combustion measures. 4. Minimize air infiltration. 5. Insulation. 6. Maintaining a minimum thermal efficiency as guaranteed by manufacturer for each fuel used	54,920 tons per year on a 12-month rolling basis of CO_2e while burning natural gas.

Emission Unit 013B Boiler #6 (EPN 013)
Westlake Vinyls, Inc. – Vinyls Plant submitted a BACT analysis for the proposed boiler, where proposed control technologies were identified and discussed. The following sections discuss the control options listed in the RBLC as BACT for similar boilers.

BACT analysis for Carbon Monoxide (CO) at Boiler #6:
Control options for CO generally consist of fuel specifications, combustion modification measures, or post-combustion controls.

Identify All Control Technologies
Use of Natural Gas

CO emissions with natural gas fired equipment are generally the lowest emission rates achievable because of the combustion efficiency of natural gas. Natural gas is processed to meet certain specifications, including methane content, heating value and sulfur content, that affect combustion efficiency.

Catalytic Oxidation

Catalytic oxidation of CO gases requires a catalyst bed located in the combustion exhaust stream. Reduction efficiencies of 90% are typical for CO.

Proper Burner Design and Good Combustion Control Practices

Proper burner design to achieve good combustion efficiency will minimize the generation of CO. Good combustion efficiency relies on both hardware design and operating procedures. A firebox design that provides proper residence time, temperature, and combustion zone turbulence, in combination with proper control of air-to-fuel ratio, is an essential element of a low-CO technology.

Limiting fuel usage at the furnace, ensures that the maximum production efficiency is achieved, while following manufacturer recommendations for burner operation assures that the

guaranteed emissions from the furnace will be achieved. There are no detrimental environmental or energy effects related to this control option.

Good Combustion Practices for the furnace include:

1. Calibrations of the excess oxygen analyzer as per the manufacturer's recommendations;
2. Calibrations and filter checks on the fuel gas analyzer as per the manufacturer's recommendations;
3. Calibration of the fuel gas flow meter as per the manufacturer's recommendations;
4. Inspect the burners and clean/replace components as per the manufacturer's recommendations;
5. Operation of the boiler with a continuous automated oxygen trim system; and
6. Conducting a tune-up of the boiler in accordance with 40 CFR 63.7540(a)(10)(i)-(iii) and 40 CFR 63.7540(a)(10)(vi)(B).

Eliminate Technically Infeasible Options

Use of Natural Gas

The sole use of natural gas is not feasible for the boiler. If fuel gas and process gas are not used in the boiler, the fuel is required to be flared, increasing the overall emissions from the system, and reducing the overall usage efficiency of the ethylene plant.

Catalytic Oxidation

Catalytic oxidation of CO gases requires a location in the exhaust path where flue gas temperatures range from 800 to 1,100°F. The exhaust gas is used for the boiler's flue gas recirculation (FGR) and the temperature is approximately 245°F after it is used as FGR. The temperature of the exhaust is not warm enough for the catalytic oxidation to be effective; therefore, catalytic oxidation is not technically feasible.

Selection of BACT

Westlake Vinyls, Inc. – Vinyls Plant will utilize clean, gaseous fuel and good combustion practices with no add-on controls, and numerical emissions limits of 0.037 lb/mmBtu and 32.67 tons per year on a 12-month rolling basis of CO as BACT for Boiler #6 EPN 013.

BACT analysis for PM, PM10, and PM2.5 at Boiler #6:

Control options for particulate matter generally consist of fuel specifications, combustion modification measures, or post-combustion controls.

Identify All Control Technologies

Use of Natural Gas

PM emissions with natural gas fired equipment are generally the lowest emission rates achievable because of the combustion efficiency of natural gas. Natural gas is processed to meet certain specifications, including methane content, heating value and sulfur content, that affect combustion efficiency.

Post Combustion PM Control

The typical controls for post-combustion particulate matter are baghouses, electrostatic precipitators (ESP), cyclones, and scrubbers.

Proper Burner Design and Good Combustion Control Practices

Proper burner design to achieve good combustion efficiency will minimize the generation of particulates. A firebox design that provides proper residence time, temperature, and combustion zone turbulence, in combination with proper control of air-to-fuel ratio, is an essential element of low PM generation.

Proper design of burner and firebox components in the heaters and boilers will provide the proper air-to-fuel ratio, proper residence time, temperature, and combustion zone turbulence essential to maintain low particulate emission levels.

Good Combustion Practices for furnaces include:

1. Calibrations of the excess oxygen analyzer as per the manufacturer's recommendations;
2. Calibrations and filter checks on the fuel gas analyzer as per the manufacturer's recommendations;
3. Calibration of the fuel gas flow meter as per the manufacturer's recommendations;
4. Inspect the burners and clean/replace components as per the manufacturer's recommendations;
5. Operation of the boiler with a continuous automated oxygen trim system; and
6. Conducting a tune-up of the boiler in accordance with 40 CFR 63.7540(a)(10)(i)-(iii) and 40 CFR 63.7540(a)(10)(vi)(B).

Eliminate Technically Infeasible Options

Use of Natural Gas

The sole use of natural gas is not feasible for the boiler. If fuel gas and process gas are not used in the boiler, the fuel is required to be flared, increasing the overall emissions from the system, and reducing the overall usage efficiency of the ethylene plant.

Post Combustion PM Control

ESPs are used exclusively on very high volume, high particulate loaded vents, commonly associated with combustion of solid fuels such as coal. Likewise, cyclones and scrubbers are used only in situations with high flows and high PM loadings. Combustion of gaseous fuels does not fit into this category; therefore, add-on controls are not a technically feasible option for the furnace.

Selection of BACT

Westlake Vinyls, Inc. – Vinyls Plant will utilize clean, gaseous fuel and good combustion practices with no add-on controls, and numerical emissions limits of 1.56 lb/hr and 6.23 tons per year on a 12-month rolling basis of PM/PM_{10}/$PM_{2.5}$.

BACT analysis for VOC at Boiler #6:

Control options for VOC generally consist of fuel specifications, combustion modification measures, or post-combustion controls. Emission control methods for VOC that are commercially available for combustion devices include:

Identify All Control Technologies

Use of Natural Gas

VOC emissions with natural gas fired equipment are generally the lowest emission rates achievable because of the combustion efficiency of natural gas. Natural gas is processed to

meet certain specifications, including methane content, heating value and sulfur content, that affect combustion efficiency.

Catalytic Oxidation

Catalytic oxidation of VOC requires a catalyst bed located in the boiler exhaust. Reduction efficiencies of 90% are typical for VOC.

Proper Burner Design and Good Combustion Control Practices:

Proper burner design to achieve good combustion efficiency will minimize the generation of VOC. Good combustion efficiency relies on both hardware design and operating procedures. A firebox design that provides proper residence time, temperature, and combustion zone turbulence, in combination with proper control of air-to-fuel ratio, is an essential element of a low- VOC technology.

Proper design of burner and firebox components in the heaters and boilers will provide the proper air-to-fuel ratio, proper residence time, temperature, and combustion zone turbulence essential to maintain low VOC emission levels. Because proper burner design and operation promotes low VOC emissions, there are no detrimental environmental or energy effects related to this control option.

Good Combustion Practices for furnaces include:

1. Calibrations of the excess oxygen analyzer as per the manufacturer's recommendations;
2. Calibrations and filter checks on the fuel gas analyzer as per the manufacturer's recommendations;
3. Calibration of the fuel gas flow meter as per the manufacturer's recommendations;
4. Inspect the burners and clean / replace components as per the manufacturer's recommendations;
5. Operation of the boiler with a continuous automated oxygen trim system; and
6. Conducting a tune-up of the boiler in accordance with 40 CFR 63.7540(a)(10)(i)-(iii) and 40 CFR 63.7540(a)(10)(vi)(B).

Eliminate Technically Infeasible Options

Use of Natural Gas

The sole use of natural gas is not feasible for the boiler. If fuel gas and process gas are not used in the boiler, the fuel is required to be flared, increasing the overall emissions from the system, and reducing the usage efficiency of the plant.

Catalytic Oxidation

Catalytic oxidation of VOC gases requires a location in the exhaust path where flue gas temperatures range from 800 to 1,100°F. The exhaust gas is used for the boiler's flue gas recirculation (FGR) and the temperature is approximately 245°F after it is used as FGR. The temperature of the exhaust is not warm enough for the catalytic oxidation to be effective; therefore, catalytic oxidation is not technically feasible.

Selection of BACT

Westlake Vinyls, Inc. – Vinyls Plant will utilize clean, gaseous fuel and good combustion practices with no add-on controls, and numerical emissions limits of 1.13 lb/hr and 4.51 tons per year on a 12-month rolling basis of VOC.

BACT analysis for GHG at Boiler #6:
Control strategies for GHG generally consist of proper combustion design and control, use of gaseous fuels, improved combustion measures (i.e., combustion tuning, optimization, and installation of instrumentation and controls); insulation; operational monitoring and proper maintenance to minimize air infiltration; and establishment of a thermal efficiency.

Identify All Control Technologies
Carbon Capture with Transportation and Dedicated Sequestration:

Carbon capture and sequestration (CCS) can make a contribution to the overall GHG reduction effort by reducing the emissions of CO_2 from the use of fossil fuels.

Selection of Low-Carbon, Gaseous Fuels:

The use of gaseous fuels with low carbon content and high heat intensity is an appropriate BACT for GHG.

Proper Boiler and Burner Design:

The efficiency of the boiler will have an impact on the overall efficiency of the facility and thus an impact on total GHG emissions. Efficient design improves mixing of fuel and creates more efficient heat transfer. In general, a more energy efficient combustion technology burns less fuel and reduces the production of GHG and other regulated air pollutants.

The proposed boiler will be designed to optimize combustion efficiency. Maximizing combustion efficiency reduces the consumption of fuel by optimizing the quantity of usable energy transferred from the fuel to the process. Proper design of burner and firebox components in the furnace will provide the proper air-to-fuel ratio, proper residence time, temperature, and combustion zone turbulence essential to maintain low CO_2 emission levels.

Good Combustion Practices:

The use of good combustion practices can minimize the potential GHG emissions associated with incomplete combustion. Good combustion practices typically entail introducing the proper ratio of combustion air to the fuel, maintaining a minimum temperature in the firebox of the combustor, or a minimum residence time of fuel and air in the combustion zone. By employing good combustion practices, GHG emissions may be greatly reduced.

Preventative maintenance of the boiler includes calibration of fuel gas flow meters and oxygen control analyzers, cleaning of burner tips and cleaning of convection section tubes. These activities insure maximum thermal efficiency is maintained.

Good Combustion Practices for furnaces include:

1. Calibrations of the excess oxygen analyzer as per the manufacturer's recommendations;
2. Calibrations and filter checks on the fuel gas analyzer as per the manufacturer's recommendations;
3. Calibration of the fuel gas flow meter as per the manufacturer's recommendations;
4. Inspect the furnace, insulation, piping and refractory, and repair / replace components as per the manufacturer's recommendations;
5. Operation of the boiler with a continuous automated oxygen trim system; and
6. Conducting a tune-up of the boiler in accordance with 40 CFR 63.7540(a)(10)(i)-(iii) and 40 CFR 63.7540(a)(10)(vi)(B).

Design a Boiler with a Specific TE Guaranteed by the Manufacturer:

Designing a boiler with a high TE is environmentally and economically beneficial to reduce fuel use, and thus GHG emissions.

Eliminate Technically Infeasible Options

Carbon Capture with Transportation and Dedicated Sequestration:

Most of the technologies needed for CCS are being used in a variety of industries but are yet to be widely applied to industry at a commercial scale. Because CCS is not commercially available, it is not a feasible control option.

Selection of Low-Carbon, Gaseous Fuels:

The sole use of natural gas is not feasible for the boiler. If fuel gas and process gas are not used in the furnaces, the fuel is required to be flared, increasing the overall emissions from the system, and reducing the usage efficiency of the plant. Therefore low-carbon gaseous fuel including fuel gases which are higher in hydrogen, will be combusted.

Selection of BACT

To minimize GHG emissions, Westlake Vinyls, Inc. – Vinyls Plant will utilize the following control methods and a numerical emission limit of 98,255 tons per year on a 12-month rolling basis of CO_2e:

1. Utilizing clean, gaseous fuel.
2. Good heater design, including insulation and minimization of potential for air infiltration;
3. Good combustion practices and proper burner design and operation;
4. Condensate Recovery and Blowdown Heat Recovery;
5. Thermal efficiency of the boiler shall be equal to or greater than 84% while burning natural gas; and
6. Thermal efficiency of the boiler shall be equal to or greater than 78% while burning process fuel gas.

The thermal efficiency of Boiler #6 is similar to the thermal efficiency of Boiler #2 as indicated by the facility in the application package.

Emission Unit 013B Boiler #6 (EPN 013) Summary

Pollutant	BACT Determination	BACT Limit
CO	1. Good combustion practices and proper operation and maintenance. 2. Use of natural gas and hydrogen fuel. 3. Complying with 40 CFR 63, Subpart DDDDD.	0.037 lb/mmBtu and 32.67 tons per year on a 12-month rolling basis
PM $PM_{2.5}$ PM_{10}	1. Good combustion practices and proper operation and maintenance. 2. Use of natural gas and hydrogen fuel. 3. Complying with 40 CFR 63, Subpart DDDDD.	1.56 lb/hr and 6.23 tons per year on a 12-month rolling basis
VOC	1. Good combustion practices and proper operation and maintenance. 2. Use of natural gas, process gas and hydrogen fuel.	1.13 lb/hr and 4.51 tons per year on a 12-month rolling basis

Pollutant	BACT Determination	BACT Limit
GHG (CO_2e)	1. Good combustion practices and proper operation and maintenance. 2. Use of natural gas, process gas and hydrogen fuel. 3. Improved combustion measures. 4. Minimize air infiltration. 5. Insulation. 6. Condensate recovery and blowdown heat recovery. 7. Thermal efficiency of the boiler shall be equal to or greater than 84% while burning natural gas; 8. Thermal efficiency of the boiler shall be equal to or greater than 78% while burning process fuel gas.	98,255 tons per year on a 12-month rolling basis

Emission Unit 036 Monomers Plant Fugitives (EPN FUG)
Westlake Vinyls, Inc. – Vinyls Plant submitted a BACT analysis for the proposed fugitive components, where proposed control technologies were identified and discussed. The following sections discuss the control options listed in the RBLC as BACT for similar ethylene facilities.

BACT analysis for VOC for Fugitive Components in VOC Service (FUG-MON-H):
The primary control strategy is an effective LDAR program. The requirements for such programs are defined in the federal and state regulations. All such programs require identification of equipment in VOC service, periodic monitoring of equipment depending upon its component type and a suitable definition of a "leaking" component, deadlines for efforts to repair and completion of repair, requirements to re-monitor repaired components to verify repair, and appropriate recordkeeping and reporting to the agency.

Identify All Control Technologies
Use of Leakless Technology for Some Components
Leakless technology valves are designed to be used in situations where highly toxic compounds are present.

Directed Maintenance with LDAR Monitoring Program
Directed maintenance with LDAR monitoring programs is primarily used to provide additional control for specific compounds that require additional emission reductions in order to pass health impacts. Specifically, directed maintenance is used to address off-property impact problems associated with piping fugitive emissions from specific compounds and fugitive emissions subject to nonattainment new source review permitting actions.

Use of an Alternative Monitoring Program using Remote Sensing Technology such as Infrared Cameras along with Repair Deadlines and Appropriate Recordkeeping and Reporting.
Using a remote sensing or infrared camera system could be used to detect leaks.

Use of Lower Leak Definitions with LDAR Monitoring
Instrument-based LDAR, following the federal NSPS and MACT regulations and lower leak definition of 500 ppm for light liquid pumps is an effective means to reduce VOC leaks.

An LDAR Program using Routine Inspection Plus Audio/Visual/Olfactory (AVO) Walk Arounds (Sensory monitoring only, as Distinguished from Instrument Detection)

Leaks could be detected and promptly repaired, while taking the appropriate recordkeeping and reporting requirements.

LDAR Program with Method 21-Compliant Analyzers

An LDAR program with Method 21-compliant analyzers, together with established federal or state requirements for identification of fugitive components, specified monitoring schedules, repair deadlines and recordkeeping and reporting requirements is the most effective control for leaking fugitive components.

Good Work Practices

Good work practices include:

1. Construction of new and reworked piping, valves, pump systems, and compressor systems shall conform to applicable American National Standards Institute (ANSI), American Petroleum Institute (API), American Society of Mechanical Engineers (ASME), or equivalent codes based on the material.
2. New and reworked buried connectors shall be welded.
3. To the extent that good engineering practice will permit, new and reworked valves and piping connections shall be reasonably accessible for leak checking during plant operation.
4. Damaged, leaking, or severely rusted valves, connectors, compressor seals, agitator seals, and pump seals found by visual inspection to be leaking (e.g., process fluids) shall be tagged and replaced or repaired. All leaking components that cannot be repaired until a scheduled shutdown shall be identified for such repair by tagging.
5. Open-ended lines are required to be equipped with a cap, plug, blind flange, or second valve.
6. New relief valves are required to vent to a control device for any potential releases and as a result, any fugitive emissions are reduced. Exceptions may be made if venting relief valves to control will result in a safety concern, but this does not exempt the company from controls such as equipping the valve with a rupture disk and pressure-sensing device.

Eliminate Technically and Economically Infeasible Options

Use of Leakless Technology for Some Components

Leakless equipment is not available for all components that may have fugitive emissions, so another program is also required for LDAR for such components. Further, leakless valves cannot be repaired without a unit shutdown. Components in the Vinyls Plant are not considered to be highly toxic; thus, these fluids do not warrant the additional risks associated with a unit shutdown for repair. For this reason, leakless valve technology is considered to be technically infeasible.

Directed Maintenance with LDAR Monitoring Program

An air toxics analysis has been performed showing no problems with any off property air impacts and the facility is not a nonattainment area, therefore directed maintenance is not applicable.

Additionally, the predicted cost of performing directed maintenance can be calculated based on $64 per hour of labor of immediate monitoring as required by directed maintenance and approximately 3.5 hours per event. Furthermore, if assuming that the same 12% of leaking

components monitored by the existing monitoring program at the facility in 2019 were leakers, then about 20 components would be leakers for the new components added during the PSD project.

$$\text{Annual Cost of Labor} = \frac{\$64}{\text{hour}} \times \frac{3.5 \text{ hour}}{\text{event}} \times \frac{20 \text{ events}}{\text{year}} = \frac{\$4{,}480}{\text{year}}$$

The emissions from the 20 leaking components can be estimated based on the following assumptions:

(1) All leaking components are light liquid valves. (highest kg/hr leak rate);
(2) Pumps are excluded because leakless pumps will be installed when possible;
(3) 75% of repairs are effective on the first attempt at repair; and
(4) The remaining 25% of repairs continue to leak at 5,000 ppm for the entire 90 days until the NSPS or MACT standard requires monitoring.

Using Table 2-9 of "Protocol for Equipment Leak Emission Estimates EPA-453/R-95-017, November 1996", and the above assumptions, the VOC emissions from new leaking components subject to PSD can be calculated as follows:

$$\frac{\left(6.41E^{-6} \times (5000 \text{ ppm})^{0.797}\right)\text{kg}}{\text{hr}} \times \frac{2.204 \text{ lb}}{\text{kg}} \times \frac{90 \text{ days}}{\text{year}} \times \frac{24\text{hr}}{\text{day}} \times (20*0.25)\text{comp} \times \frac{\text{ton}}{2000 \text{ lb}} = \frac{0.068 \text{ ton}}{\text{year}}$$

Therefore, the cost of implementing directed maintenance would be as follows:

$$\text{Total Cost} = \frac{\text{Annual Cost of Labor (\$4,480 per year)}}{\text{Leaking Emissions Avoided (0.068 tons per year)}} = \frac{\$66{,}163}{\text{ton VOC Controlled}}$$

At $66,163 per ton of VOC controlled, directive maintenance is not economically cost effective, and is therefore not considered BACT pursuant to 401 KAR 51:001, Section 1(25)(a).

Use of an Alternative Monitoring Program using Remote Sensing Technology such as Infrared Cameras along with Repair Deadlines and Appropriate Recordkeeping and Reporting.

Using a remote sensing or infrared camera system, does not quantify the size or concentration of a leak which are needed to trigger further monitoring and repair requirements. Furthermore, there are currently no federally mandated programs that allow Remote Sensing Technology without also including Method 21 monitoring other than 40 CFR 60, Subpart OOOOa.

An LDAR Program using Routine Inspection Plus Audio/Visual/Olfactory (AVO) Walk Arounds (Sensory monitoring only, as Distinguished from Instrument Detection)

AVO observation-based LDAR programs are not as effective as instrument-based or remote sensing programs for non-odorous chemicals.

Selection of BACT

Westlake Vinyls, Inc. – Vinyls Plant will use the most stringent VOC based instrument monitoring system applicable to the new components in VOC service (FUG-MON-H), as BACT and will implement the following:

1. The permittee will continue to follow MACT H LDAR program as required by the regulations, and promptly repairing any leaking components in accordance with the LDAR plan.

2. Leak is defined as a reading of 500 ppmv.
3. The permittee will install leakless pumps with dual mechanical seals or with a barrier fluid to reduce leaks, as possible. If a leakless pump is not feasible, the permittee shall submit justification as to its technical infeasibility.
4. The permittee will monitor new non-leakless pumps to a leak detection threshold of 500 ppm.
5. The permittee will utilize Good Work Practices.

BACT analysis for VOC for Fugitive Components in Natural Gas Service (FUG-MON-NG):
The primary control strategy is an effective LDAR program. The requirements for such programs are defined in the federal and state regulations. All such programs require identification of equipment in VOC service, periodic monitoring of equipment depending upon its component type and a suitable definition of a "leaking" component, deadlines for efforts to repair and completion of repair, requirements to re-monitor repaired components to verify repair, and appropriate recordkeeping and reporting to the agency. These measures could also be used for fugitive emissions of VOC from pipeline equipment in Natural Gas Service that contain less than 10% VOC and less than 5% HAP; and are not also subject to a NSPS or NESHAP (MACT).

Identify All Control Technologies

Use of Leakless Technology for Some Components

Leakless or low-leak technology valves are designed to be used in situations where highly toxic compounds are present.

Directed Maintenance with LDAR Monitoring Program

Directed maintenance with LDAR monitoring programs is primarily used to provide additional control for a specific compounds that require additional emission reductions in order to pass health impacts. Specifically, directed maintenance is used to address off property impact problems associated with piping fugitive emissions from specific compounds and fugitive emissions subject to nonattainment new source review permitting actions.

Use of an Alternative Monitoring Program using Remote Sensing Technology such as Infrared Cameras along with Repair Deadlines and Appropriate Recordkeeping and Reporting.

Using a remote sensing or infrared camera system could be used to detect leaks.

An LDAR Program using Routine Inspection Plus Audio/Visual/Olfactory (AVO) Walk Arounds (Sensory monitoring only, as Distinguished from Instrument Detection)

Leaks could be detected and promptly repaired, while taking the appropriate recordkeeping and reporting requirements.

LDAR Program with Method 21-Compliant Analyzers

An LDAR program with Method 21-compliant analyzers, together with established federal or state requirements for identification of fugitive components, specified monitoring schedules, repair deadlines and recordkeeping and reporting requirements is the most effective control for leaking fugitive components.

Good Work Practices

Good work practices include:

1. Construction of new and reworked piping, valves, pump systems, and compressor systems shall conform to applicable American National Standards Institute (ANSI), American

Petroleum Institute (API), American Society of Mechanical Engineers (ASME), or equivalent codes based on the material.

2. New and reworked buried connectors shall be welded.
3. To the extent that good engineering practice will permit, new and reworked valves and piping connections shall be reasonably accessible for leak checking during plant operation.
4. Damaged, leaking, or severely rusted valves, connectors, compressor seals, agitator seals, and pump seals found by visual inspection to be leaking (e.g., process fluids) shall be tagged and replaced or repaired. All leaking components that cannot be repaired until a scheduled shutdown shall be identified for such repair by tagging.
5. Open-ended lines are required to be equipped with a cap, plug, blind flange, or second valve.
6. New relief valves are required to vent to a control device for any potential releases and as a result, any fugitive emissions are reduced. Exceptions may be made if venting relief valves to control will result in a safety concern, but this does not exempt the company from controls such as equipping the valve with a rupture disk and pressure-sensing device.

Eliminate Technically Infeasible Options

Use of Leakless Technology for Some Components

Leakless or low-leak equipment is not available for all components that may have fugitive emissions and their use is significantly limited by material of construction considerations and process operating conditions, so another program would also be required for the majority of components for which leakless or low-leak technology is not applicable. Leakless or low-leak technology valves are designed to be used in situations where highly toxic compounds are present. Further, leakless or low-leak valves cannot be repaired without a unit shutdown. Natural gas streams are not considered to be highly toxic; thus, these fluids do not warrant the additional risks associated with a unit shutdown for repair. For these reasons, leakless or low-leak valve technology is considered to be technically infeasible.

Directed Maintenance with LDAR Monitoring Program

An air toxics analysis has been performed showing no problems with any off-property air impacts and the facility is not a nonattainment area, therefore directed maintenance is not applicable.

Use of an Alternative Monitoring Program using Remote Sensing Technology such as Infrared Cameras along with Repair Deadlines and Appropriate Recordkeeping and Reporting.

Using a remote sensing or infrared camera system, does not quantify the size or concentration of a leak which are needed to trigger further monitoring and repair requirements. Furthermore, there are currently no federally mandated programs that allow Remote Sensing Technology without also including Method 21 monitoring other than 40 CFR 60, Subpart OOOOa.

An LDAR Program using Routine Inspection Plus Audio/Visual/Olfactory (AVO) Walk Arounds (Sensory monitoring only, as Distinguished from Instrument Detection)

AVO observation-based LDAR programs are not as effective as instrument-based or remote sensing programs for non-odorous chemicals. Furthermore, non-odorized natural gas can be purchased by the facility.

Selection of BACT
Westlake Vinyls, Inc. – Vinyls Plant will use the most stringent VOC based instrument monitoring system applicable to the new components in natural gas service (FUG-MON-NG), as BACT and will implement the following:

1. The permittee will use instrument based LDAR consistent with the requirements for gas/vapor valves and connectors subject the requirements of 40 CFR 63, Subpart H.
2. Leak is defined as a reading of 500 ppmv.
3. The permittee will utilize Good Work Practices.

BACT analysis for GHG for Fugitive Components in Natural Gas Service (FUG-MON-NG):
The fugitive emissions controls presented in this analysis will provide similar levels of emission reduction for both CO_2 and CH_4; therefore, the BACT evaluation for these two pollutants has been combined into a single analysis.

Identify All Control Technologies
Use of Leakless Technology for Some Components

Leakless or low-leak technology valves are designed to be used in situations where highly toxic compounds are present.

Directed Maintenance with LDAR Monitoring Program

Directed maintenance with LDAR monitoring programs is primarily used to provide additional control for a specific compounds that require additional emission reductions in order to pass health impacts. Specifically, directed maintenance is used to address off-property impact problems associated with piping fugitive emissions from specific compounds and fugitive emissions subject to nonattainment new source review permitting actions.

Use of an Alternative Monitoring Program using Remote Sensing Technology such as Infrared Cameras along with Repair Deadlines and Appropriate Recordkeeping and Reporting.

Using a remote sensing or infrared camera system could be used to detect leaks.

An LDAR Program using Routine Inspection Plus Audio/Visual/Olfactory (AVO) Walk Arounds (Sensory monitoring only, as Distinguished from Instrument Detection)

Leaks could be detected and promptly repaired, while taking the appropriate recordkeeping and reporting requirements.

LDAR Program with Method 21-Compliant Analyzers

An LDAR program with Method 21-compliant analyzers, together with established federal or state requirements for identification of fugitive components, specified monitoring schedules, repair deadlines and recordkeeping and reporting requirements is the most effective control for leaking fugitive components.

Design and Construct Facilities with High Quality Components

Facilities can incorporate high quality fugitive components with materials of construction compatible with the process to provide longer term emissions control.

Good Work Practices

Good work practices include:

1. Construction of new and reworked piping, valves, pump systems, and compressor systems shall conform to applicable American National Standards Institute (ANSI), American Petroleum Institute (API), American Society of Mechanical Engineers (ASME), or equivalent codes based on the material.
2. New and reworked buried connectors shall be welded.
3. To the extent that good engineering practice will permit, new and reworked valves and piping connections shall be reasonably accessible for leak checking during plant operation.
4. Damaged, leaking, or severely rusted valves, connectors, compressor seals, agitator seals, and pump seals found by visual inspection to be leaking (e.g., process fluids) shall be tagged and replaced or repaired. All leaking components that cannot be repaired until a scheduled shutdown shall be identified for such repair by tagging.
5. Open-ended lines are required to be equipped with a cap, plug, blind flange, or second valve.
6. New relief valves are required to vent to a control device for any potential releases and as a result, any fugitive emissions are reduced. Exceptions may be made if venting relief valves to control will result in a safety concern, but this does not exempt the company from controls such as equipping the valve with a rupture disk and pressure-sensing device.

Eliminate Technically Infeasible Options

Use of Leakless Technology for Some Components

Leakless or low-leak equipment is not available for all components that may have fugitive emissions and their use is significantly limited by material of construction considerations and process operating conditions, so another program would also be required for the majority of components for which leakless or low-leak technology is not applicable. Leakless or low-leak technology valves are designed to be used in situations where highly toxic compounds are present. Further, leakless or low-leak valves cannot be repaired without a unit shutdown. Natural gas streams are not considered to be highly toxic; thus, these fluids do not warrant the additional risks associated with a unit shutdown for repair. For these reasons, leakless or low-leak valve technology is considered to be technically infeasible.

Directed Maintenance with LDAR Monitoring Program

An air toxics analysis has been performed showing no problems with any off property air impacts and the facility is not a nonattainment area, therefore directed maintenance is not applicable.

Use of an Alternative Monitoring Program using Remote Sensing Technology such as Infrared Cameras along with Repair Deadlines and Appropriate Recordkeeping and Reporting.

Using a remote sensing or infrared camera system, does not quantify the size or concentration of a leak which are needed to trigger further monitoring and repair requirements. Furthermore, there are currently no federally mandated programs that allow Remote Sensing Technology without also including Method 21 monitoring other than 40 CFR 60, Subpart OOOOa.

An LDAR Program using Routine Inspection Plus Audio/Visual/Olfactory (AVO) Walk Arounds (Sensory monitoring only, as Distinguished from Instrument Detection)

AVO observation-based LDAR programs are not as effective as instrument-based or remote sensing programs for non-odorous chemicals. Furthermore, non-odorized natural gas can be purchased by the facility.

Selection of BACT
Westlake Vinyls, Inc. – Vinyls Plant will use the most stringent GHG based instrument monitoring system applicable to the new components in natural gas service (FUG-MON-NG), as BACT and will implement the following:

1. Instrument-based LDAR will be implemented on the components in natural gas service in the Vinyls Plant consistent with the requirements for gas/vapor valves and connectors in MACT H service.
2. Leak is defined as a reading of 500 ppmv.
3. The permittee will utilize good piping design and good work practices.
4. The permittee will install high quality/compatible components designed with gaskets and other materials of construction for the service for which they are intended, providing long term control.

Emission Unit 036 Monomers Plant Fugitives (FUG-MON-H) Summary

Pollutant	BACT Determination
VOC	1. LDAR program with instrument sensors together with 40 CFR 63, Subpart H requirements. 2. Leak is defined as a reading of 500 ppmv. 3. Use of leakless pumps with dual mechanical seals or with a barrier fluid to reduce leaks. 4. New non-leaking pumps to a leak detection threshold of 500 ppm. 5. Good work practices.

Emission Unit 036 Monomers Plant Fugitives (FUG-MON-NG) Summary

Pollutant	BACT Determination
VOC	1. LDAR program with instrument sensors consistent with 40 CFR 63, Subpart H requirements. 2. Leak is defined as a reading of 500 ppmv. 3. Good work practices.
GHG (CO_2e)	1. LDAR program with instrument sensors consistent with 40 CFR 63, Subpart H requirements. 2. Leak is defined as a reading of 500 ppmv 3. Good piping design and work practices. 4. Installation of high quality/compatible components to provide long term control.

APE20190010 (Minor Revision Incorporated with Renewal)

- The Division received the Westlake Vinyls, Inc. – Vinyls Plant application for a minor revision to permit V-13-041 R5 for the installation of additional equipment to increase the chlorine production from 900 tons per day (tpd) to 1,200 tpd on December 14, 2018, which would require 740,220 tpy of salt based on the conversion factor of 1.69 tons of salt consumed per tons of chlorine produced.

- On October 4, 2019, the Division received a minor revision to permit V-13-041 R5 to update the amount of salt needed at EPN 801A/B/C/D for the 1,200 tpd chlorine production from 740,220 tpy to 757,740 tpy based on a more accurate conversion factor of 1.73 tons of salt consumed per tons of chlorine produced. The increase in the amount of salt needed resulted in an increase of particulate matter from the EPN 801A/B/C/D requiring an updated PSD analysis as follows:

PSD Criteria Pollutant	CO	NO_x	SO_2	PM	PM_{10}	$PM_{2.5}$	VOC
Emissions Increase	0.665	36.50	0.009	5.94	2.96	0.52	0.75
PSD Significance Emissions Rate	100	40	40	25	15	10	40
Further PSD Review Needed	No	No	No	No	No	No	No

As shown above, the expansion does not trigger further review under 401 KAR 51:017. PM, PM_{10}, and $PM_{2.5}$ emissions increase, but no other pollutants changed as a result of the updated conversion factor.

PSD Modeling Analysis:

Screening Methodology
The incremental increases in ambient pollutant concentrations associated with the Westlake Chemical Corporation (Westlake) project will be estimated through the use of the American Meteorological Society / Environmental Protection Agency Regulatory Model (AERMOD) Version 19191 applied in conformance to applicable guidelines. A protocol was prepared following Appendix W, as published in Federal Register on January 17, 2017.

The Division's net emission increase calculations differ slightly from those performed by Westlake; however, the represented emission increases in the modeling demonstration performed by Westlake are conservative. The Division believes the modeling has sufficiently represented that there will be no impacts on NAAQS for the area.

Model simulations for short-term and annual-averaged CO, PM_{10}, and $PM_{2.5}$ emissions are performed with AERMOD using the 5-year meteorological database. For each pollutant, the maximum value over 5 years for each applicable time averaging period is compared to the appropriate SIL.

SIL Results for PSD NAAQS

Pollutant	Averaging Period	Model Conc.	SIL	Secondary $PM_{2.5}$ Conc.	Total Conc.	Percent of Threshold	Additional Review Required?
		($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	(%)	
PM_{10}	24-hour	1.7565	5	N/A	1.7565	35.13	No
	Annual	0.2834	1	N/A	0.2834	28.34	No
$PM_{2.5}$	24-hour	1.1569	1.2	0.0045	1.1614	96.78	No
	Annual	0.2748	0.3*	0.0007	0.2755	91.83	No
CO	1-hour	372.50	2000	N/A	372.50	18.63	No
	8-hour	73.79	500	N/A	73.79	14.76	No

Note: Section 2.1.1 of the PSD Air Quality Analysis Report received by the Division in March 2020 and Updated in May 2020 provides the justification to use a $PM_{2.5}$ annual SIL of 0.3 $\mu g/m^3$.

As a part of significant impact analyses, the ambient impacts from the proposed project must also be compared against the associated SMCs in Pre-construction Monitoring Analyses Results Table below to determine if preconstruction monitoring is required for pollutants whose impacts are above their respective SMCs. The following table compares the predicted off-property concentrations to the associated SMCs. As shown below, CO 8-hour and PM_{10} 24-hour-concentrations are below the SMC thresholds; therefore, preconstruction monitoring is not expected to be required.

Pre-construction Monitoring Analyses Results

Pollutant	Averaging Period	SMC Model Concentration ($\mu g/m^3$)	SMC Threshold ($\mu g/m^3$)	Percent of Threshold (%)	Additional Review Required?
PM_{10}	24-hour	1.7565	10	17.57	No
CO	8-hour	73.7947	575	12.83	No

Class I Area Analysis

Class I area impacts are addressed if the proposed project has an impact that exceeds the screening threshold as described by Federal Land Managers' (FLM) Air Quality Related Values Work Group (FLAG) guidance. In this guidance the sum of the proposed project emissions (in tons per year) of SO_2, NO_x, PM_{10} and H_2SO_4 is divided by the distance to the Class I area and compared to the value of 10. This ratio is known as Q/D. If Q/D is 10 or less, the project is considered to have a negligible impact on the Class I area. If the Q/D value is greater than 10, then further analysis to evaluate impacts in the Class I area is warranted.

There is only one Federal Class I area within 300 km of the Westlake: Mingo National Wildlife Refuge in Missouri at 150 km. The sum of emissions (SO_2, NO_x, PM_{10} and H_2SO_4) for the proposed project is 41.36 tons/year. The calculated Q/D for the proposed project relative to Mingo National Wildlife Refuge is 0.276; as such no additional evaluation of Class I area impacts are required.

Class I Area Q/D Screening Analysis

Pollutant	Project Emissions (tons/year)	Q/D Analysis
NO_2	0.0*	
SO_2	6.76†	
PM_{10}	34.60	
H_2SO_4	0.0	
Total	41.36	
Mingo National Wildlife Refuge	150 km	0.276

* The NO_X project net emissions increase is negative (i.e., a decrease) so zero (0) is conservatively used for NO_X in the sum for Q instead of the negative number.

† The SO_2 emission rate listed is the site-wide PTE after the project instead of just the project increase.

In addition, receptors are placed at 48, 49 and 50 kms due west of the facility to show concentrations that could be expected towards the Mingo National Wildlife Refuge. The table below shows the maximum concentrations at the 48, 49 and 50 km receptors.

Receptors Towards Mingo National Wildlife Refuge

Pollutant	Averaging Period	48 km Model Concentration ($\mu g/m^3$)	49 km Model Concentration ($\mu g/m^3$)	50 km Model Concentration ($\mu g/m^3$)	Total Conc. Percentage (%)
PM_{10}	24-hour	0.0618	0.0586	0.0689	1.38
	Annual	0.0031	0.0031	0.0031	0.31
$PM_{2.5}$	24-hour	0.0447	0.0435	0.0434	3.73
	Annual	0.0037	0.0036	0.0036	1.23
CO	1-hour	16.7894	16.5081	16.3133	0.84
	8-Hour	8.1254	7.9914	7.8551	1.63

A cursory review of the elevations for distances of 48 km, 49 km and 50 km was performed and the elevations from 48 km to 50 km in most cases are decreasing. It was concluded that the elevations are not definitive enough to be the cause of the increase in concentrations at those receptors. The total concentration percentage of the SIL at 50 km for each pollutant and averaging period is also provided in the above table. The concentrations are still well below the SIL as the impacts are less than 1.5% of the SIL for all pollutants at 50 km.

Modeled Emission Rates for Precursors

Pursuant to the DAQ guidance document "Application of the EPA's Modeled Emission Rates for Precursors (MERPs) for Secondary Pollutant Formation in Kentucky" dated August 2, 2018, (DAQ MERPs guidance) MERPs have been utilized as a Tier 1 demonstration tool for ozone and $PM_{2.5}$ since emission rates affecting those constituents are proposed to be above the applicable significant emission rates. The required ozone and $PM_{2.5}$ demonstrations are satisfied with the worst-case default MERP values listed in Table 3 of the DAQ MERPs guidance.

Default MERP Values for Kentucky PSD Applications

Precursor	8-Hour Ozone (tpy)	Daily $PM_{2.5}$ (tpy)	Annual $PM_{2.5}$ (tpy)
NOx	169	2,449	8,333
SO_2	-	1,500	10,000
VOC	3,333	-	-

For the evaluation of the project with respect to ozone, the sum of the project's proposed NO_X net emissions increase in tons per year (tpy) divided by the NO_X MERP (tpy) for ozone and the project's proposed VOC emissions increase (tpy) divided by the VOC MERP (tpy) is compared to the 8-hour ozone SIL of 1 ppb. If the sum, as shown in the equation below, is less than one, the project is deemed to not have a significant impact on ambient 8-hour ozone levels, and there is no need to conduct a cumulative analysis for ozone.

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

Ozone MERPs Demonstration

Averaging Period	NO_X Project Emissions (tpy)	NO_X MERP (tpy)	VOC Project Emissions (tpy)	VOC MERP (tpy)	Total	Is Total < 1?
8-hour Ozone	0	169	75.53	3,333	0.023	YES

Since the sum from the above equation is less than one, the project is deemed to not have a significant impact on ambient 8-hour ozone levels.

The applicable equation is shown below, and the max $PM_{2.5}$ Modeled Concentration is the highest value (annual or H1H 24-hour concentration averaged over five years) of direct $PM_{2.5}$ emission increases modeled using AERMOD. If the sums of the equation for both the 24-hour and annual $PM_{2.5}$ averaging periods are less than 1, the project will be deemed to not have a significant impact on ambient $PM_{2.5}$ concentrations, and there is no need to conduct a cumulative analysis for $PM_{2.5}$.

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

Ozone MERPs Demonstration

Averaging Period	Max $PM_{2.5}$ Modeled Conc. ($\mu g/m^3$)	$PM_{2.5}$ SIL ($\mu g/m^3$)	NO_X Project Emissions (tpy)	NO_X MERP (tpy)	SO_2 Project Emissions (tpy)	SO_2 MERP (tpy)	Total	Is Total < 1?
24-Hour $PM_{2.5}$	1.1569	1.2	0	2,449	6.76	1,500	0.9686	YES
Annual $PM_{2.5}$	0.2748	0.3	0	8,333	6.76	10,000	0.9167	YES

The result of the $PM_{2.5}$ daily MERPs analysis is 0.969, and the result of the $PM_{2.5}$ annual MERPs analysis is 0.917. Since the sums from the above equations are less than one for both daily and annual $PM_{2.5}$ analyses, the project is deemed to not have a significant impact on ambient $PM_{2.5}$ levels.

Maximum $PM_{2.5}$ Modeled Concentrations and Applicable SILs

Averaging Period	Max Modeled Concentration ($\mu g/m^3$)	Secondary $PM_{2.5}$ Conc. ($\mu g/m^3$)	Total $PM_{2.5}$ Conc. ($\mu g/m^3$)	SIL ($\mu g/m^3$)
Daily (24-hour)	1.1569	0.0045	1.1614	1.2
Annual	0.2748	0.0007	0.2755	0.3*

Note: Section 2.1.1 of the PSD Air Quality Analysis Report received by the Division in March 2020 and Updated in May 2020 provides the justification to use a $PM_{2.5}$ annual SIL of 0.3 $\mu g/m^3$.

Alternate Operating Scenarios:

As part of project, the facility has requested simultaneous operation of the ethylene flare (EPN 321 and EPN 321A) at the Westlake Chemical OpCo, LP facility and Boiler #1, Boiler #4 and, Boiler #6 (EPN 008, EPN 011, and EPN 013) at the Westlake Vinyls, Inc.–Vinyls Plant.

Until the removal of the existing flare EU# 007 (EPN 321), the existing flare shall not be operated beyond 180 days after startup of EU# 007A (EPN 321A). Upon startup of EU# 007A (EPN 321A), the combined operating rate of EU# 007 (EPN 321) and EU# 007A (EPN 321A) shall not exceed 56.1 mmBtu/hr on a 30-day rolling average. Westlake Chemical OpCo, LP (AI 122899) shall keep records of the daily average individual and combined operating rates (in mmBtu/hr) and calculate a 30-day rolling average. Westlake Chemical OpCo, LP (AI 122899) shall send notification of the anticipated date of initial start-up of the new flare EU# 007A (EPN 321A) postmarked no more than sixty (60) days nor less than thirty (30) days prior to such date.

Simultaneous operation of EPN 011 (Boiler #4), EPN 008 (Boiler #1), and EPN 013 (Boiler #6) shall be allowed such that the combined firing rate of the 3 boilers shall not exceed 201.58 mmBtu/hr on a 24-hour average basis. In addition, within 24 months after the final issuance of permit V-19-016, or within 180 days after startup of EPN 013, whichever is sooner, EPN 011 and EPN 008 shall be permanently shut down. This is to ensure that the decrease in NOx emissions is included in the contemporaneous period, to preclude applicability of Sections 8 through 15 of 401 KAR 51:017.

V-19-016 Emission Summary		
Pollutant	2018 Actual (tpy)	V-19-016 Potential to Emit (tpy)
CO	232.52	522.36
NO_X	231.35	180.12
PT	50.77	53.01
PM_{10}	36.61	46.30
$PM_{2.5}$	35.11	38.12
SO_2	1.23	2.90
VOC	280.88	205.30
Greenhouse Gases (GHGs)		
Carbon Dioxide	323,567.72	531,182.97
Methane	14.85	542.39
Nitrous Oxide	3.04	5.97
CO_2 Equivalent (CO_2e)	324,889.44	546,521.23
Hazardous Air Pollutants (HAPs)		
1,2-Dichloroethane	51.118	25.094
Benzene	0.430	2.877
Carbon Tetrachloride	6.153	5.292
Chlorine	20.892	3.438
Chloroethane	1.824	2.912
Chloroform	2.710	1.324
Hydrochloric Acid	5.414	62.500
Naphthalene	0.196	5.215
Styrene	0.122	3.224
Toluene	0.020	0.547
Vinyl Chloride	58.566	30.776
Combined HAPs:	151.147	144.406

APPENDIX A – ABBREVIATIONS AND ACRONYMS

BACT – Best Available Control Technology
Btu – British thermal unit
CO – Carbon Monoxide
CI – Compression Ignition
Division – Kentucky Division for Air Quality
GHG – Greenhouse Gas
HAP – Hazardous Air Pollutant
HCl – Hydrogen Chloride
HF – Hydrogen Fluoride (Gaseous)
ICE – Internal Combustion Engines
LAER – Lowest Achievable Emission Rate
mmBtu/hr – million Btu per hour
mmscf – million standard cubic feet
NESHAP – National Emissions Standards for Hazardous Air Pollutants
NO_x – Nitrogen Oxides
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
RACT – Reasonable Available Control Technology
RBLC – RACT/BACT/LAER Clearinghouse
RICE – Reciprocating Internal Combustion Engines
SER – Significance Emissions Rate
SO_2 – Sulfur Dioxide
VCM – Vinyl Chloride Monomer
VOC – Volatile Organic Compounds